2.0 Subbasin Assessment – Water Quality Concerns and Status

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. Pursuant to Section 303 of the CWA, States and tribes are required to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). Currently, states and tribes are required to publish a priority list of impaired waters every two years. For waters identified on this list, states and tribes must develop ~~a~~ total maximum daily loads (TMDLs) for the pollutants, with the goal of achieving federal water quality standards.

This document addresses the water bodies in the Weiser River Watershed that have been placed on the §303(d) list.

2.1 Introduction

In 1972, Congress passed the Federal Water Pollution Control Act, which is commonly called the Clean Water Act. The goal of this act was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Water Pollution Control Federation 1987). The act and the programs it has generated have changed over the years as experience and perceptions of water quality have changed. The CWA has been amended 15 times, most significantly in 1977, 1981, and 1987. One of the goals of the 1977 amendment was protecting and managing waters to insure "swimmable and fishable" conditions. This goal, along with a 1972 goal to restore and maintain chemical, physical, and biological integrity, relates water quality with more than just chemistry.

Background

The federal government, through the U.S. Environmental Protection Agency (EPA), assumed the dominant role in defining and directing water pollution control programs across the country. The Department of Environmental Quality (DEQ) implements the CWA in Idaho, while EPA oversees Idaho's efforts and certifies the fulfillment of CWA requirements and responsibilities.

Section 303 of the CWA requires DEQ to adopt water quality standards, with EPA approval, and to review those standards every three years. Additionally, DEQ must monitor waters to identify those water bodies not meeting water quality standards. For those water bodies not meeting standards, DEQ must establish TMDLs for each pollutant impairing the waters. Further, DEQ must set appropriate controls to restore water quality and allow the water bodies to achieve their designated uses.

These requirements result in a list of impaired waters called the "§303(d) list." This list describes water bodies that do not meet water quality standards and require further analysis. A subbasin assessment and TMDL provide a summary of the water quality status and allowable TMDL for water bodies on the §303(d) list. The *Weiser River Watershed Subbasin Assessment and Total Maximum Daily Loads* provides this summary for the currently listed waters in the Weiser River Watershed.

The subbasin assessment section of this report (Chapters 1–4) includes an evaluation and summary of the current water quality status, pollutant sources, and control actions to date in the Weiser River Watershed. While this assessment is not a requirement of the TMDL, DEQ performs the assessment to ensure impairment listings are up to date and accurate. The TMDL is a plan to improve water quality by limiting pollutant loads. Specifically, a TMDL is an estimation of the maximum pollutant amount that can be present in a water body and still allow that water body to meet water quality standards (Water quality planning and management, 40 CFR 130). Consequently, a TMDL is water body- and pollutant-specific.

The TMDL also includes individual pollutant allocations among various sources discharging the pollutant. EPA considers certain unnatural conditions pollution, such as flow alteration, a lack of flow, or habitat alteration, even when it is not the result of the discharge of specific pollutants. A TMDL is not required for a water body impaired by pollution. In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed.

Idaho's Role

Idaho adopts water quality standards to protect public health and welfare, enhance the quality of water, and protect biological integrity. A water quality standard defines the goals of a water body by designating the use or uses for the water, setting criteria necessary to protect those uses, and preventing degradation of water quality through antidegradation provisions.

The state may assign or designate beneficial uses for particular Idaho water bodies to support. These beneficial uses are identified in the Idaho water quality standards and include the following:

- Aquatic life support – cold water, seasonal cold water, warm water, salmonid spawning, modified
- Contact recreation – primary (swimming), secondary (boating)
- Water supply – domestic, agricultural, industrial
- Wildlife habitats, aesthetics

The Idaho legislature designates uses for water bodies. Industrial water supply, wildlife habitat, and aesthetics are designated beneficial uses for all water bodies in the state. If a water body is unclassified, then cold water and primary contact recreation are used as additional default designated uses when water bodies are assessed.

A subbasin assessment entails analyzing and integrating multiple types of water body data, such as biological, physical/chemical, and landscape data to address several objectives:

- Determine the degree of designated beneficial use support of the water body (i.e., attaining or not attaining water quality standards)

- Determine the degree of achievement of biological integrity.

- Compile descriptive information about the water body, particularly the identity and location of pollutant sources.

- Determine the causes and extent of the impairment when water bodies are not attaining water quality standards

2.2 Water Quality Limited Segments Occurring in the Subbasin

The water bodies listed on the Idaho 1998 §303(d) list are the Weiser River itself and tributaries to the river. Three segments of the Weiser River are listed as not supporting their beneficial uses, while nine other segments are also listed for not supporting beneficial uses. The uses determined not to be fully supported include cold water aquatic life, salmonid spawning, and primary contact recreation or secondary contact recreation.

The pollutants listed as impairing these uses include sediment, temperature, bacteria, nutrients, and flow alteration. Figure 22 shows the current §303(d) listed segments, those segments added in 1998, and those segments removed (de-listed) in 1998. Table 13 shows Idaho 1998 §303(d) listed segments in the Weiser River Watershed, a description of each listed water body, the length of the impaired water body, and the pollutant of concern. The Idaho §305(b) Report (Idaho DEQ 1988) and BURP monitoring provided the basis for most listings.

The water bodies described in Table 13 are either identified in the WQS for the protection of designated beneficial uses or are undesignated. In accordance with Idaho WQS, those water bodies that have designated uses are to be protected for those uses where attainable (IDAPA 52.01.02.100). For those water bodies not identified in the WQS, they are to be protected for the existing uses (IDAPA 52.01.02.100). Table 14 shows the water bodies that have designated uses as described in the WQS and what those uses are. Table 14 also lists those streams without designated uses.

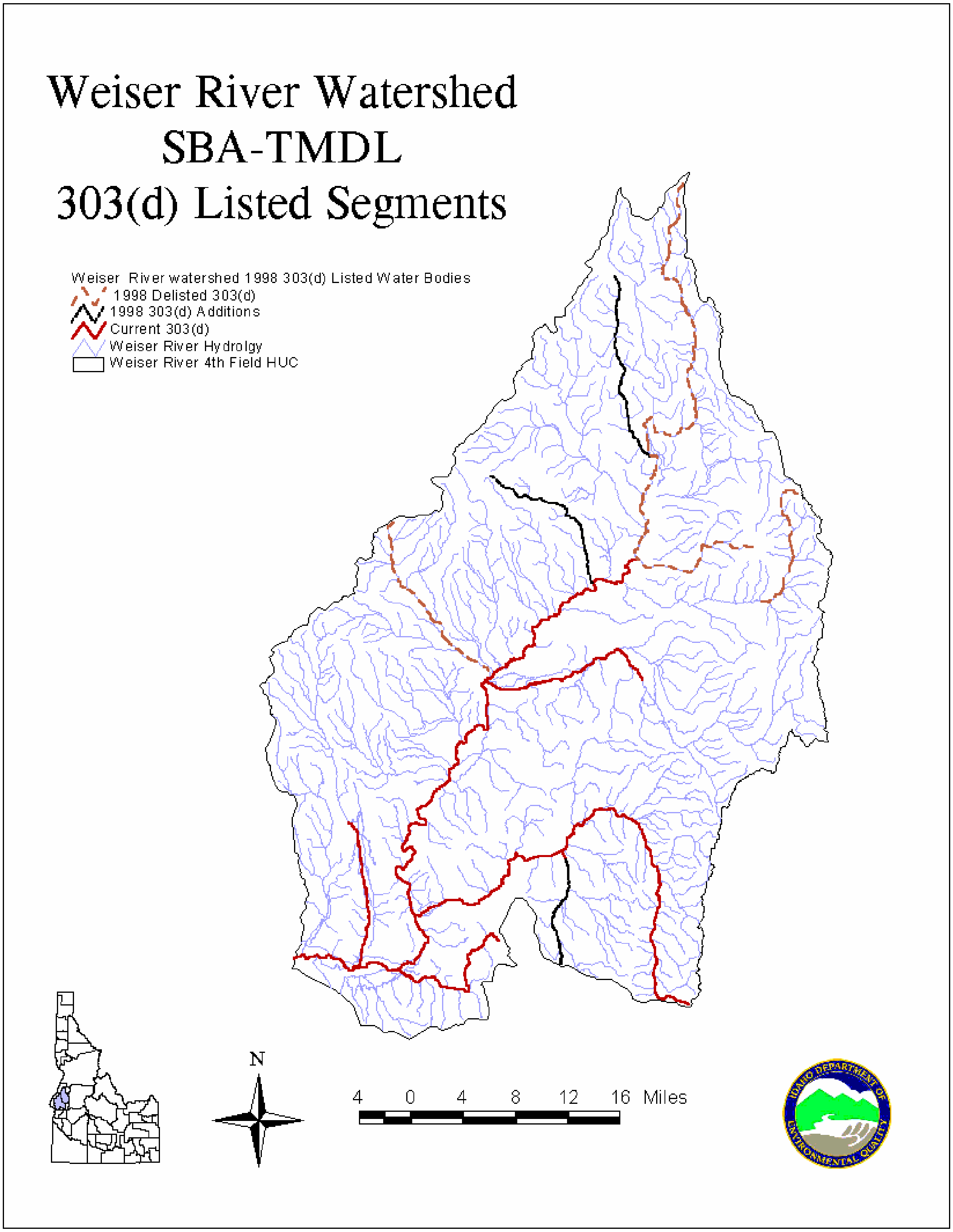


Figure 22. Idaho's §303(d) listed water bodies and delisted water bodies. Weiser River Watershed.

Another important factor in the development of the SBA is the downstream receiving waters. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has set a load allocation for its tributaries. Load allocations have been set for the Weiser River and other tributaries to meet both sediment and nutrient targets for the Snake River.

Table 13. Idaho 1998 §303(d) listed Water Bodies, Water Body Description, Pollutants of Concern, and Miles of Impaired Sections. Weiser River Watershed.

Water Body	Boundary	Pollutant(s)	Miles/Acres of Impaired Water Bodies
Weiser River	Galloway Dam to Snake River	Nutrients, Sediment, Bacteria, Dissolved Oxygen, and Temperature	12.4 miles
Weiser River	Little Weiser River to Galloway Dam	Nutrients, Sediment and Bacteria	31.5 miles
Weiser River	West Fork Weiser River to Little Weiser River	Nutrients and Sediment	20.9 miles
Mann Creek	Mann Creek Reservoir to Weiser River	Sediment	13.0 miles
Cove Creek	Headwaters to Weiser River	Nutrients and Sediment	14.0 miles
Crane Creek	Crane Creek Reservoir to Weiser River	Bacteria, Nutrients, and Sediment	12.6 miles
Little Weiser River	Indian Valley to Weiser River	Nutrients and Sediment	17.2 miles
West Fork Weiser River	Headwaters to Weiser River	Unknown	15.9 miles
Johnson Creek	Headwaters to Weiser River	Unknown	13.7 miles
North Crane Creek	Headwaters to Crane Creek Reservoir	Bacteria, Flow, Nutrients, Sediment, and Temperature	24.7 miles
South Crane Creek	Headwaters to Crane Creek Reservoir	Unknown	9.2 miles
Crane Creek Reservoir	Reservoir	Nutrients and Sediment	1,507 acres

Table 14. Idaho 1998 §303(d) list Water Bodies, Designated Uses, and IDAPA Citations. Weiser River Watershed.

Water Body	Designated Uses	IDAPA Citation
Weiser River (Keithly Creek to Mouth)	Cold Water Aquatic Life Primary Contact Recreation Drinking Water Supply	58.01.02.140.18.SW-1
Weiser River (Source to Keithly Creek)	Cold Water Aquatic Life Primary Contact Recreation Drinking Water Supply Special Resource Water	58.01.02.140.18.SW-7
Mann Creek (Reservoir to Mouth)	Cold Water Aquatic Life Salmonid Spawning Primary Contact Recreation	58.01.02.140.18.SW-30
Cove Creek	No Designated Uses	
Crane Creek	Cold Water Aquatic Life Primary Contact Recreation	58.01.02.140.18.SW-3
Little Weiser River	Cold Water Aquatic Life Salmonid Spawning Primary Contact Recreation Drinking Water Supply	58.01.02.140.18.SW-8
Johnson Creek	Cold Water Aquatic Life Salmonid Spawning Primary Contact Recreation	58.01.02.140.18.SW-22
West Fork Weiser River	Cold Water Aquatic Life Salmonid Spawning Primary Contact Recreation Drinking Water Supply Special Resource Water	58.01.02.140.18.SW-17
North Crane Creek	No Designated Uses	
South Crane Creek	No Designated Uses	
Crane Creek Reservoir	Cold Water Aquatic Life Primary Contact Recreation	58.01.02.140.18.SW-4

2.3 Applicable Water Quality Standards

Beneficial Uses

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses are interpreted as existing uses, designated uses, and "presumed" uses as briefly described in the following paragraphs. The *Water Body Assessment Guidance*, second edition (Grafe et al. 2002), gives a more detailed description of beneficial use identification for use assessment purposes.

Existing Uses

Existing uses under the CWA are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." The existing in stream water uses and the level of water quality necessary to protect the uses shall be maintained and protected (IDAPA 58.01.02.003.35, .050.02, and 051.01 and .053). Existing uses include uses actually occurring, whether or not the level of quality to fully support the uses exists.

Designated Uses

Designated uses under the CWA are "those uses specified in water quality standards for each water body or segment, whether or not they are being attained." Designated uses are uses that are officially recognized by the state. In Idaho, these uses include aquatic life support, recreation in and on the water, domestic water supply, and agricultural use. Water quality must be sufficiently maintained to meet the most sensitive use. Designated uses may be added or removed using specific procedures provided for in state law, but the effect must not be to preclude protection of an existing higher quality use such as cold water aquatic life or salmonid spawning. Designated uses are specifically listed for water bodies in Idaho in tables in the Idaho water quality standards (See IDAPA 58.01.02.003.22 and .100; and IDAPA 58.01.02.109-160 in addition to citations for existing uses).

Presumed Uses

In Idaho, most water bodies listed in the tables of designated uses in the water quality standards do not yet have specific use designations. These undesignated uses are to be designated. In the interim, and absent information on existing uses, DEQ presumes that most waters in the state will support cold water aquatic life and either primary or secondary contact recreation (IDAPA 58.01.02.101.01). To protect these presumed use water bodies, DEQ will apply the numeric cold water and primary or secondary contact recreation criteria to undesignated waters. If in addition to these presumed uses an additional existing use applies (e.g., salmonid spawning), the additional numeric criteria for salmonid spawning would additionally apply (e.g., intergravel dissolved oxygen and temperature) because of the requirement to protect levels of water quality for existing uses. However, if cold water is not found to be an existing use, for example, an applicable use designation is needed before other aquatic life criteria (such as seasonal cold) can be applied in lieu of cold water criteria (IDAPA 58.01.02.101.01).

Changes to Water Quality Standards

Water quality standards include designated uses and water quality criteria. One or both of these components of water quality standards may change or be removed from a water body, or site-specific criteria may be developed to reflect increased understanding of the factors that affect water quality. Changes in water quality standards necessarily affect TMDL objectives, targets and load allocations. During the development of this TMDL, questions from stakeholders regarding the appropriateness of certain designated uses and criteria have been raised and are currently under investigation. The outcome of these investigations will be reviewed by DEQ and, in consultation with the WAG a determination will be made whether to initiate the process to change uses or criteria. If a change is made to a designated use or a water quality criteria applicable to a water body for which this TMDL has been developed, DEQ shall, in consultation with the WAG, evaluate whether the TMDL or implementation plans should be modified to reflect the change in the use or criteria. Changes in the TMDL shall be accomplished pursuant to the requirements of state and federal law, including the requirements for public participation, and be submitted to the US EPA for approval.

Beneficial Use Support Status

To determine if a water body is fully supporting the designated and existing uses, IDAPA 58.01.02.053 is applied, which outlines measures to be taken to determine use support. Accordingly, IDAPA 58.01.02.053.01 and .053.02 state the following:

> In determining whether a water body fully supports designated and existing beneficial uses, the Department shall determine whether all of the applicable water quality standards are being achieved, including any criteria developed pursuant to these rules, and whether a healthy, balanced biological community is present. The Department shall utilize biological and aquatic habitat parameters listed below and in the current version of the "Water Body Assessment Guidance," as published by the Idaho Department of Environmental Quality, as a guide to assist in the assessment of beneficial use status. Revisions to this guidance will made be after notice and an opportunity for public comment. These parameters are not to be considered or treated as individual water quality criteria or otherwise interpreted or applied as water quality standards. (4-5-00)
>
> **01. Aquatic Habitat Parameters**. These parameters may include, but are not limited to, stream width, stream depth, stream shade, measurements of sediment impacts, bank stability, water flows, and other physical characteristics of the stream that affect habitat for fish, macroinvertebrates or other aquatic life; and (3-20-97)
>
> **02. Biological Parameter**s. These parameters may include, but are not limited to, evaluation of aquatic macroinvertebrates including Ephemeroptera, Plecoptera and Trichoptera (EPT), Hilsenhoff Biotic Index, measures of functional feeding groups, and the variety and number of fish or other aquatic life to determine biological community diversity and functionality. (3-20-97)

IDAPA 58.01.02.053.03 addresses natural conditions and states the following:

> **03. Natural Condition**s. There is no impairment of beneficial uses or violation of water quality standards where natural background conditions exceed any applicable water quality criteria as determined by the Department, and such natural background conditions shall not, alone, be the basis for placing a water body on the list in IDAPA 58.01.054.1 of water quality limited water bodies described in Section 054. (3-15-02)

Assessment Process to Determine Beneficial Use Support Status

As described in IDAPA 58.01.02.053, the *Water Body Assessment Guidance* (Grafe et al 2002) will be used as a guide in assessing the support status of beneficial uses. The guidance document addresses both numeric criteria established in the WQS and the habitat and biological assessment requirements to determine the support status for aquatic life, recreation use, water supply uses, and salmonid spawning. Figure 23 shows an example of the process used to determine whether enough data are available to support a status determination for a water body and the criteria used to make the status determination for aquatic life. Additional schematics for other uses can be found within the Water Body Assessment Guidance (Grafe et al. 2002).

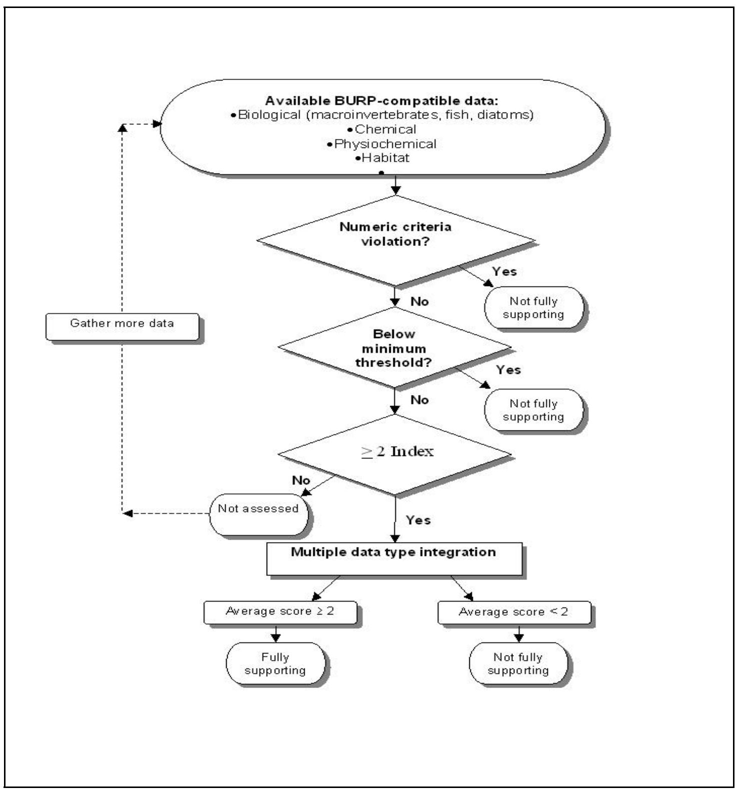


Figure 23. Aquatic Life Support Determination Flow-Chart. Weiser River Watershed.

Numeric criteria exceedances are usually a straightforward comparison of water quality data to the numeric criteria established in the WQS. The *Water Body Assessment Guidance* (Grafe et al. 2002) includes criteria adopted from guidance established by EPA's *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305 (b) Reports)* for the conventional pollutants dissolved oxygen, pH, and temperature. To determine support status, water bodies with equal to or less than 10% exceedence of these parameters in a given data set are considered fully supporting of aquatic life uses. Greater than 10% exceedence would be considered not fully supporting.

To evaluate aquatic life use, DEQ applies multimetric indices based on rapid bioassessment concepts developed by EPA (Barbour et al. 1999). Measurements of biological, physical habitat or physicochemical conditions known as metrics comprise the indices. The indices include several characteristics to gage overall ecosystem health. The multimetric index value for a sample site is the sum of individual metric scores. Multimetric index scores are unitless and, therefore, easily comparable.
The strength of such an approach is the integration of biological, physical, and chemical characteristics of the water body at different scales—individual, population, community, and ecosystem (Karr et al. 1986). This integration allows DEQ to determine water quality impairment cost-effectively and present the information in an intelligible format.

Table 15 describes the metrics used, what is evaluated, and additional references.

Appendix B provides the metric analysis and scoring used in the final assessment process for water bodies in the Weiser River Watershed.

Table 15. Multimetric Analysis Approach. Weiser River Watershed.

Index	Analysis Approach	Reference Material
Streams[a]		
Stream Macroinvertebrates Index	Direct biological measurement using key macroinvertebrate species indicators	*Development of a multimetric index for biological assessment of Idaho streams using macroinvertebrates* (Jessup and Gerrritsen 2000), *Rapid bioassessment for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates and fish* (Barbour et al. 1999)
Stream Fish Index	Direct biological measurement using key fish species indicators	*Stream fish inde*x (Mebane 2000)
Stream Habitat Index	Direct measurement of habitat and riparian indicators	*Stream Habitat Index* (Fore and Bollman 2000)
Rivers[b]		
River Macroinvertebrate Index	Direct biological measurement using key macroinvertebrate species indicators	*River Macroinvertebrate Index* (Royer and Mebane 2000) *Bioassessment methods for Idaho rivers; validation and summary* (Royer and Minshall 1999)
River Diatom Index	Direct biological measurement using key periphyton species indicators	*River Diatom Ind*ex (Fore and Grafe 2000)
River Fish Index	Direct biological measurement using key fish species indicators	*River fish inde*x (Mebane 2000)
River Physicochemical Index[c]	Measurement of key water quality indicators	*Oregon water quality index: A tool for evaluating water quality management effectiveness* (Cude in press) *River Physicochemical Index* (Brandt 2000)

a usually water bodies less than 5th order
b usually water bodies greater than or equal to 5th order water bodies
c river physicochemical usually supplied as informational only and not incoporated into final metric score

Intermittent Water Bodies

Some water bodies in Idaho may have discharge for short periods of time. These water bodies may flow only as a result of snow melt or heavy precipitation events. In either case, it can not be expected that these water bodies provide full support of beneficial uses. As such, Idaho has adopted WQS to address intermittent waters as follows (IDAPA 58.01.02.53):

> **Intermittent Waters**. A stream, reach, or water body which has a period of zero (0) flow for at least one (1) week during most years. Where flow records are available, a stream with a 7Q2 hydrologically based flow of less than one-tenth (0.1) cfs is considered intermittent. Streams with natural perennial pools containing significant aquatic life uses are not intermittent.

The following Idaho WQS (IDAPA 58.01.02.070.06.) apply to the cold water aquatic life and primary and secondary contact recreation beneficial uses:

> **Application of Standards to Intermittent Water**s. Numeric water quality standards only apply to intermittent waters during optimum flow periods sufficient to support the uses for which the water body is designated. For recreation, optimum flow is equal to or greater than five (5) cubic feet per second (cfs). For aquatic life uses, optimum flow is equal to or greater than one (1) cfs.

TMDLs and Other Appropriate Action

If a water body is determined to be not fully supporting the designated or existing uses, IDAPA 58.01.02.054.01 and .054.02 would apply. These standards state the following:

> **01. After Determining That Water Body Does Not Support Use**. After determining that a water body does not fully support designated or existing beneficial uses in accordance with Section 053, the Department, in consultation with the applicable basin and watershed advisory groups, shall evaluate whether the application of required pollution controls to sources of pollution affecting the impaired water body would restore the water body to full support status. This evaluation may include the following: (3-20-97)
>
> a. Identification of significant sources of pollution affecting the water body by past and present activities; (3-20-97)
>
> b. Determination of whether the application of required or cost-effective interim pollution control strategies to the identified sources of pollution would restore the water body to full support status within a reasonable period of time; (3-20-97)
>
> c. Consultation with appropriate basin and watershed advisory groups, designated agencies and landowners to determine the feasibility of, and assurance that required or cost-effective interim pollution control strategies can be effectively

applied to the sources of pollution to achieve full support status within a reasonable period of time; (3-20-97)
d. If pollution control strategies are applied as set forth in this Section, the Department shall subsequently monitor the water body to determine whether application of such pollution controls were successful in restoring the water body to full support status. (3-20-97)

02. Water Bodies Not Fully Supporting Beneficial Uses. After following the process identified in Subsection 054.01, water bodies not fully supporting designated or existing beneficial uses and not meeting applicable water quality standards despite the application of required pollution controls shall be identified by the Department as water quality limited water bodies, and shall require the development of TMDLs or other equivalent processes, as described under Section 303(d) (1) of the Clean Water Act. A list of water quality limited water bodies shall be published periodically by the Department in accordance with Section 303(d) of the Clean Water Act and be subject to public review prior to submission to EPA for approval. Informational TMDLs may be developed for water bodies fully supporting beneficial uses as described under Section 303(d)(3) of the Clean Water Act, however, they will not be subject to the provisions of this Section. (3-20-97)

2.4 Target Analysis

Idaho utilizes both numeric and narrative criteria to determine if beneficial uses are supported or not supported. The numeric criteria, such as temperature or pH, applies a value or range to protect beneficial uses, while the narrative criteria applies a general condition or status, such as nuisance aquatic growth for nutrients, to determine compliance.

Numeric Criteria

The numeric criteria provide specific targets that are to be achieved for the full support of the uses. If the specific criteria are exceeded, then it is determined that the use is not fully supported due to that exceedence. For the Weiser River Watershed, specific numeric criteria apply to the cold water aquatic life, salmonid spawning, and contact recreation beneficial uses.

Cold Water Aquatic Life

For the protection of cold water aquatic life, numerous numeric criteria have been adopted to protect the beneficial use. Most of the numeric criteria can be found in IDAPA 58.01.02.250.02, which states the following:

02. Cold Water. Waters designated for cold water aquatic life are not to vary from the following characteristics due to human activities: (3-15-02)

a. Dissolved Oxygen Concentrations exceeding six (6) mg/l at all times. In lakes and reservoirs this standard does not apply to: (7-1-93)

i. The bottom twenty percent (20%) of water depth in natural lakes and reservoirs where depths are thirty-five (35) meters or less. (7-1-93)

ii. The bottom seven (7) meters of water depth in natural lakes and reservoirs where depths are greater than thirty-five (35) meters. (7-1-93)

iii. Waters of the hypolimnion in stratified lakes and reservoirs. (7-1-93)

b. Water temperatures of twenty-two (22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C. (8-24-94)"

Contact Recreation

The WQS describe applicable standards and criteria for the full support of both primary and secondary contact recreation. These standards also describe minimal sampling requirements. IDAPA 58.01.02.080.03.a and .03.b state the following:

03. E. coli Standard Violation. A single water sample exceeding an *E. coli* standard does not in itself constitute a violation of water quality standards, however, additional samples shall be taken for the purpose of comparing the results to the geometric mean criteria in Section 251 as follows: (4-5-00)

a. Any discharger responsible for providing samples for *E. coli* shall take five (5) additional samples in accordance with Section 251. (4-5-00)

b. The Department shall take five (5) additional samples in accordance with Section 251 for ambient *E. coli* samples unrelated to dischargers' monitoring responsibilities.

A description of applicable physical attributes that must be addressed before a determination of possible violations is addressed in IDAPA 58.01.02.100.02.a and .02.b, which state the following:

02. Recreation. (7-1-93)

a. Primary contact recreation (PCR): water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving. (4-5-00)

b. Secondary contact recreation (SCR): water quality appropriate for recreational uses on or about the water and which are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur. (4-5-00)

The numeric criteria to determine if a water body is supporting either primary or secondary contact recreation are found in IDAPA 58.01.02.251.01. These criteria state the following:

01. E. Coli Bacteria. Waters designated for recreation are not to contain E.coli bacteria, used as indicators of human pathogens, in concentrations exceeding: (4-11-06)

a. Geometric Mean Criterion. Waters designated for primary or secondary contact recreation are not to contain E. coli bacteria in concentrations exceeding a geometric mean of one hundred twenty-six (126) E. coli organisms per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to seven (7) days over a thirty (30) day period. (4-11-06)

b. Use of Single Sample Values. A water sample exceeding the E. coli single sample maximums below indicates likely exceedance of the geometric mean criterion, but is not alone a violation of water quality standards. If a single sample exceeds the maximums set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., then additional samples must be taken as specified in Subsection 251.01.c.: (4-11-06)

i. For waters designated as secondary contact recreation, a single sample maximum of five hundred seventy-six (576) E. coli organisms per one hundred (100) ml; or (4-11-06)

ii. For waters designated as primary contact recreation, a single sample maximum of four hundred six (406) E. coli organisms per one hundred (100) ml; or (4-11-06)

iii. For areas within waters designated for primary contact recreation that are additionally specified as public swimming beaches, a single sample maximum of two hundred thirty-five (235) E. coli organisms per one hundred (100) ml. Single sample counts above this value should be used in considering beach closures. (4-11-06)

c. Additional Sampling. When a single sample maximum, as set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., is exceeded, additional samples should be taken to assess compliance with the geometric mean E. coli criteria in Subsection 251.01.a. Sufficient additional samples should be taken by the Department to calculate a geometric mean in accordance with Subsection 251.01.a. This provision does not require additional ambient monitoring responsibilities for dischargers.

Sources of Bacteria

In the past, DEQ has prepared bacteria TMDLs for other rivers in Idaho, and EPA has approved them. Recognizing the need to prioritize best management practices to reduce bacterial sources, the lower Boise River Watershed Advisory Group (WAG) applied for and received a federal §319 grant to conduct bacterial DNA source testing throughout the watershed. The goals of the DNA testing program were to attempt to define sources of bacteria at sampling locations in the river and tributaries and to help illustrate the applicability of the testing methodology for use in other watersheds.

The study results suggested that humans, pets, avian/waterfowl, agriculture, and wildlife contributed to bacteria concentrations in the river. Locations surrounded by urban land uses showed a proportionally higher number of human and pet sources than locations surrounded by agricultural lands. Conversely, locations surrounded by agricultural land uses showed a higher number of agricultural sources of bacteria. Avian/waterfowl sources comprised the largest percentage at nearly every location, regardless of land use.

While the aforementioned results suggest that uncontrollable sources of bacteria, such as avian and waterfowl exist in the watershed, the results also suggest the existence of controllable sources, such as human, pet, and agricultural. Therefore, the implementation of best management practices in the watershed is being initiated such that controllable source pathways will be managed.

Similar methods of study could be applied to the Weiser River Watershed. Because the bacterial concentrations from each respective source group (humans, pets, etc.) cannot be quantified, data from previous studies cannot be used to adjust the load allocations. . For this reason, the best application of the study and resulting data would be in a manner similar to that used in the lower Boise River, which is to focus the spending of valuable implementation resources on identified controllable sources~~.~~ (CH2M Hill, 2003).

Temperature

The Weiser River TMDL reach is listed for temperature from the Little Weiser River to the Snake River. See the Addendum to the Weiser River Subbasin Assessment and TMDL for information about the Potential Natural Vegetation (PNV) temperature TMDL. This TMDL utilizes IDAPA 58.01.02.053. BENEFICIAL USE SUPPORT STATUS which states:

> **Natural Conditions**. There is no impairment of beneficial uses or violation of water quality standards where natural background conditions exceed any applicable water quality criteria as determined by the Department, and such natural background conditions shall not, alone, be the basis for placing a water body on the list of water quality limited water bodies described in Section 054. (3-15-02)

It is projected that implementation projects associated with improved riparian areas will result in reduced inflow temperatures in the smaller drains and tributaries to the Weiser River as many of the approved methods for the reduction of temperature are based on streambank revegetation and similar methodologies that will increase shading.

Anthropogenic temperature influence assessments, similar to those conducted for the Lower Boise River and the Snake River-Hells Canyon TMDL reach will be completed as part of the tributary TMDL processes.

Changes to State of Idaho Water Quality Standards

Language regarding standard exceedances from naturally occurring sources is also contained in the following:

> When natural background conditions exceed any applicable water quality criteria...the applicable water quality criteria shall not apply, instead, pollutant levels shall not exceed the natural background conditions, except that temperature levels may be increased above natural background conditions when allowed under Section 401 (IDAPA 58.01.02.200.09 [2002]).

This standard was approved by DEQ Board and the Idaho State Legislature and came into effect on March 15, 2002.

Narrative Criteria

Idaho has adopted narrative criteria to address two pollutants of concern in the Weiser River Watershed. The general surface water quality criteria, IDAPA 58.01.02.200, address sediment and nutrients. Both narrative criteria imply that impairment to the beneficial uses must be demonstrated before a violation or an exceedence is occurring.

Nutrient Criteria

The general surface water quality criteria for nutrients are found in IDAPA 58.01.02.200.06, which states the following:

> **200. GENERAL SURFACE WATER QUALITY CRITERIA.** The following general water quality criteria apply to all surface waters of the state, in addition to the water quality criteria set forth for specifically designated waters. (4-5-00)
>
> **06. Excess Nutrient**s. Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses. (8-24-94)

Nutrients are essential elements for all living organisms and are found naturally in the soil, the air, the water, and the biota. Natural chemical, physical, and biological activity can process different forms of nutrients. Some forms of nutrients are bio-available while others are not. Unto themselves, most forms of nutrients are not toxic to biota. However, excessive nutrients can cause harm to biota.

Nutrients are necessary in water to provide a healthy and diverse biological community, yet an overly nourished system can cause an over abundance of plant growth, toxic-nuisance aquatic growth, human and animal health risks, and a change in plant and animal community structures.

In Idaho, the narrative criteria have been applied to various beneficial uses, including contact recreation, agriculture water supply, and cold water aquatic life, and have been used in TMDLs in a variety of waters (e.g., Middle Snake River [Idaho DEQ 2000*a*], Cascade Reservoir [Idaho DEQ 1997], and Snake River – Hells Canyon [Idaho DEQ and Oregon DEQ 2002]). The narrative nutrient criteria have also been used as a mechanism to recommend the removal or listing of nutrients as a pollutant of concern on various water bodies in the state (e.g., Lower Payette River [Idaho DEQ 1999*a*] and Upper Owyhee River [Idaho DEQ 2003]).

The following are examples of how the nutrient criteria have been applied to create a "linkage" to nutrient levels and beneficial use support:

- *The Cascade Reservoir Phase One Watershed Management Plan* (*Cascade Reservoir SBA-TMDL*) (Idaho DEQ 1996) linked nuisance aquatic growth to a toxin that was associated with the death of 23 cattle in 1994. The blue-green algae growth in Cascade Reservoir was determined to be caused by excessive nutrients in the reservoir. Thus, the water body was not fully supporting agricultural water supply. This was addressed in the TMDL.

- *The Middle Snake River TMDL* (Idaho DEQ 2000) addressed the effect of nuisance aquatic growth on recreational uses, such as the clogging of jet boat intakes by rooted macrophytes growth in the river. Excessive nutrients contributed to this nuisance aquatic growth. Thus, the water body was not fully supporting secondary contact recreation, and a TMDL was developed to address excessive nutrients.

- The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) linked nutrient levels and dissolved oxygen sags associated with respiration periods and fish kills that occurred in the early 1990s. The dissolved oxygen sags were linked to the rapid die-off of phytoplankton associated with high-nutrient levels earlier that spring. Thus, the water body was not fully supporting cold water aquatic life, and a TMDL was developed to address excessive nutrients.

- *The Lower Payette River SBA-TMDL* (Idaho DEQ 1999*a*) determined that nutrient concentrations were a factor in aquatic growth but did not impair beneficial uses in the Payette River. The conclusion was based on 24-hour dissolved oxygen monitoring which indicated that dissolved oxygen concentrations did not fall below the water quality standard and was not causing an impairment to cold water aquatic life.

- *The Upper Owyhee Watershed SBA-TMDL* (Idaho DEQ 2003) noted low dissolved oxygen concentrations in Deep Creek located in the Owyhee River drainage area. Twenty-four-hour monitoring indicated that dissolved oxygen levels had dropped below the water quality standard during the evening and nighttime period. The preliminary conclusion was that nuisance aquatic growth could be the cause. It was recommended that dissolved oxygen be listed as a pollutant of concern.

As demonstrated in the above examples, the link between nutrients and impairment of beneficial uses can be either indirect (dissolved oxygen sags associated with respiration periods) or direct (death of cattle from algae or impaired recreational use due to aquatic growths). Although the direct impairment might be the simplest way of determining impairment, most impairments occurring in surface waters are not straightforward and are not always well documented.

Another approach used for TMDLs in Idaho is to use literature values from EPA's *Quality Criteria for Water (Gold Book)* (EPA 1986) as an appropriate target to determine whether or not impairment exists (e.g., *Bruneau River SBA-TMDL* [Idaho DEQ 2000*b*]). The development of TMDLs based on this information is also based on the interpretation of the Idaho standards narrative criteria stating that "Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses". (IDAPA 58.01.02.200.06 [1994])

This approach may have merit when it is determined that a designated use may not be an existing use due to impairment and when water quality data indicate nutrient concentrations are at levels that can cause impairment. However, additional information, or a link, should be provided that would demonstrate the cause and effect of the nutrients and the probable impact to the use or uses, such as complaints concerning aquatic growth (slime growth), eutrophic conditions, odors, recreational health issues, or other possible impairment associated with nuisance aquatic growth.

Few states or tribes have incorporated numeric criteria into their WQS, and most rely on narrative criteria, including Idaho. In some states, site-specific criteria have been established for water bodies, primarily lakes and reservoirs, to prevent eutrophic conditions and impairment to beneficial uses. However, no site-specific, numeric criteria for nutrients have been established in Idaho.

EPA has issued several documents that address nutrients and ambient water quality (EPA 1986 and EPA 2000). EPA *Quality Criteria for Water (Gold Book)* (EPA 1986) provides researched threshold values and recommends nutrient criteria. The *Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria for Rivers and Streams in Nutrient Ecoregion III* (EPA 2000) provides recommended regional nutrient criteria based on analysis of data from different regions in the xeric (dry) western United States.

Additional literature values based on either a controlled environment or actual environmental case studies have been completed throughout the world. Although many studies focused on individual water bodies or receiving waters, many studies have provided threshold values that can be applied to most water bodies. These studies usually provide an endpoint where it has been shown that eutrophic conditions can begin. Some of these endpoints are directed at the causal variable (e.g., nitrate, total phosphorus, dissolved ortho-phosphate, etc.). However, some endpoints are directed at the response variable (e.g., chlorophyll *a,* water clarity, etc.) associated with eutrophic conditions.

With research, water quality monitoring, and mathematical modeling, some states have incorporated response variable endpoints into their WQS (e.g., Oregon's 15 µg/L chlorophyll *a* concentrations [Oregon 340-41-950]). Although not direct numeric criteria for nutrients, these variable response indicators are for eutrophic conditions and can be used as a target or goal for water quality. With these indicator targets or goals established, numerous mathematical models can be applied to determine a water body's assimilation capacity for nutrients (e.g., *Snake River-Hells Canyon SBA-TMDL* CE-QUALE2 model [Idaho DEQ and Oregon DEQ 2004]). This is a type of backdoor approach to achieve and support a beneficial use. This approach appears to be more acceptable than a one size fits all application of a causal variable numeric criterion.

In the Weiser River Watershed, seven rivers and one reservoir are listed for nutrients. One segment, the lower Weiser River, has dissolved oxygen listed as a pollutant of concern, which may or may not be associated with nutrient enrichment. For the rivers and streams, 24-hour dissolved oxygen measurements were taken to determine if the listed water bodies are impaired by nutrients. This monitoring showed that dissolved oxygen concentrations did not fall below the water quality standard and was not causing an impairment to cold water aquatic life. Further information can be found in Figure 34 and in the accompanying narrative on page 91.

Table 16 provides a synopsis and reference for applicable WQS for nutrients, literature/research values, targets/goals for similar water bodies in the region, and established WQS criteria in other states.

Table 16. Water Quality Standards, Criteria, and Literature Reviews. Weiser River Watershed.

Applicable Criteria	Citation
Narrative Criteria	
Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses.	IDAPA 58.01.02.200.06
Total Phosphorus Targets (casual variable)	
Total phosphorus concentration of 0.025 mg/L	*Cascade Reservoir TMDL* (Idaho DEQ 1996)
Flowing waters total phosphorus concentration[a] 0.042 mg/L[b].	*Ambient Water Quality Criteria Recommendations; Rivers and streams in Nutrient Region III, Xeric West* (EPA 2000)
Flowing waters total phosphorus concentration 0.10 mg/L. Flowing waters discharging to lake or reservoir 0.05 mg/L. Lakes and Reservoirs 0.025 mg/L.	EPA Recommended Criteria for Total Phosphorus, *Quality Criteria for Water Quality* (EPA Gold Book) (EPA 1986)
Indicator Targets (response variable)	
Chlorophyll *a* concentration of 15 µg/L[c].	State of Oregon Water Quality Standard 340-41-150
Chlorophyll *a* concentration[a] of 11 µg/L.	*Ambient Water Quality Criteria Recommendations; Lakes and Reservoirs in Nutrient Region III, Xeric West* (EPA 2001)
Chlorophyll *a* concentration of 10 µg/L.	*Cascade Reservoir TMDL* (Idaho DEQ 1996)
Chlorophyll *a* concentration of 20 µg/L.	Carlson (1977) *Trophic Status of Lakes*

a represents median value for 25th percentile of all data
b milligrams per liter
c micrograms per liter

Sediment Criteria

The general surface water quality criteria for sediment are found in IDAPA 58.01.02.200.08, which states the following:

> **08. Sedimen**t. Sediment shall not exceed quantities specified in Sections 250 and 252, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350. (4-5-00)

Impairment to designated uses is usually associated with two forms of water column sediment: bedload and suspended sediment. Impairment by sediment may also be exacerbated by lack of suitable habitat for cold water aquatic life (e.g., pools and riffles).

Bedload sediment can be defined as the sediment that is transported along the substrate. This transport is associated with the rolling or short-term suspension of sediment.

Bedload sediment transport is a direct result of stream velocity, substrate roughness, and available energy. Available energy is usually determined by the amount of sediment already in suspension or bedload being moved through the system. This is not to say that suspended sediment cannot become bedload sediment. As stream velocity decreases and/or available energy decreases, suspended sediment will drop from the water column and may continue to be transported as bedload sediment.

Bedload sediment, especially fine sediment of less than 6 mm in diameter, can cause impairment of uses in a variety of ways. Bedload sediment can fill in gravels associated with salmonid spawning, cover redds and reduce intergravel dissolved levels, encase fry, fill in interstitial spaces required for fry development and salmonid food sources, reduce pool volume required for salmonid refugia areas, and cover substrate required for primary food (periphyton) production areas.

Presently, no bedload data are available on the lower Weiser River. This is due in part to the difficulty in monitoring this parameter, especially on a large river system where the high velocity associated with peak flows prevents such monitoring. However, surrogate measures could be implemented to assist in determining the amount of bedload sediment. These surrogate measures can include substrate evaluation, pool filling, riffle-pool ratio, and number or ratio of pools in a given segment.

Suspended sediment and total suspended solids (TSS) are usually associated with that fraction of the sediment load suspended within the water column. Suspended sediment and TSS, as with bedload sediment, is directly related to stream velocity and available energy for sediment transport. The transport of suspended sediment can also vary depending on the size of the sediment and/or buoyancy of the particle being transported. That is, some sediment may be colloidal in nature, have high-surface tension, and/or be highly buoyant and remain suspended even in a stagnant water column, such as a lake or reservoir.

Suspended sediment and TSS can affect designated uses by hampering sight-feeding fishes' the ability to find food, aggravating fishes' gills, and reducing fishes' and macroinvertebrates' ability to utilize dissolved oxygen.

Numerous studies have been conducted on the effects of sediment on salmonid species. Sigler, Bjorn, and Forest (1984) determined turbidity levels as low as 25 nephelometric turbidity units (NTUs) can inhibit fish growth, and levels between 100-300 NTUs will cause fish to die or seek refuge in other channels. Suspended sediment concentrations at levels of 100 milligrams per liter (mg/L) have been shown to reduce the survival of juvenile rainbow trout (Herbert and Merkens 1961).

Newcombe and Jensen (1996) reported the effects of suspended sediment on fish, summarizing 80 published reports on suspended sediment in streams and estuaries. For rainbow trout, the lethal effects of suspended sediment were observed at concentrations of 50 to 100 mg/L when those concentrations are maintained for 14 to 60 days. Similar effects are observed for other species. Adverse effects on habitat, especially spawning and rearing habitat, were noted at similar sediment concentrations.

Sediment loads can influence turbidity, nutrient concentrations, absorption of toxic substances and bed form characteristics. Sediment distribution through water-based transport is essential in many ecological processes (e.g., fertilization of land through annual flooding), but increased sediment loads resulting from extreme meteorological events or human activities can adversely affect an aquatic ecosystem. (NRCS, 2001).

Total suspended solids data have been used as a surrogate for the assessment of sediment within this system. Both TSS and suspended sediment concentration (SSC) values may include algae and other organic matter that do not directly correlate with inorganic sediment concentrations in the water column.

Common Sources

Common sources of sediment within the Weiser River TMDL reach are predominantly erosion-based as well as from instream biological productivity. Sediment may originate from natural causes, such as landslides, forest or brush fires, high flow events or from anthropogenic sources, such as erosion from roadways, agricultural lands, urban/suburban stormwater runoff, and construction sites. Sediment loads within the system are highest in the spring when high flow volumes and velocities result from snowmelt in higher elevations.

Although quantitative information on common sources of sediment in the Weiser River TMDL is unavailable, it is recognized that a substantial amount of sediment can be generated and transported relatively long distances by extreme precipitation events, such as the January 1997 rain-on-snow event in the Weiser River Watershed. It has been estimated that, although they occur only rarely, such events can account for the movement of a greater volume of sediment in a single event than would be expected to occur in an entire water year under average conditions (DEQ, 1998c; BCC, 1996)

As with the total phosphorus analysis, sediment data for the lower Weiser River is limited to the studies and monitoring mentioned in this document. However, different agencies have conducted sediment monitoring by using different analytical methods. Table 17 shows the years that monitoring was conducted, by whom it was conducted, which form of analysis was used, and the characteristics of each analytical method.

Table 17. Sediment Analysis Techniques Used on Suspended Sediment Monitoring for the Weiser River. Weiser River Watershed.

Agency	Years of Data	Analyte	Analytical Method	Analytical Method Characteristics
Bureau of Reclamation	1987-1989	Non-Filterable Residue (Total Suspended Solids)	EPA 160.2 SM1 2540D	May underestimate some suspended sediment; aliquot sample heated to 180 °C
U.S. Geological Survey	1996-1998 and 2000	Suspended Sediment	SM1 D3977-97	Entire sample evaporated at 110 °C
DEQ	1982-1983 2000-2001	Suspended Sediment Total Suspended Solids	SM1 D3977-97 EPA 160.2	Entire sample evaporated at 110 °C May underestimate some suspended sediment; aliquot sample heated to 180 °C
Idaho Department of Agriculture	2000-2002	Total Suspended Solids	EPA 160.2 SM1 2540D	May underestimate some suspended sediment; aliquot sample heated to 180 °C

Sediment Literature Values and Research

Lloyd (1987) suggested turbidity levels up to 23 NTUs for moderate level protection of salmonid species. For a high level of protection, Lloyd (1987) suggested keeping turbidity levels up to 7 NTUs. For example, Nevada has set a numeric turbidity standard of less than or equal to 25 NTUs to protect aquatic life, water supply, and recreational use in Lake Mead (Nevada NAC §445A.195).

Most studies have demonstrated that turbidity levels exceeding 25-30 NTUs will impair aquatic life use by causing reduced fish growth, reduced survival, reduced abundance, respiratory stress, and increased ventilation. Avoidance, reduced energy intake, and displacement can occur at turbidity levels of 22 to greater than 200 NTUs (Bash, Berman, and Bolton 2001).

Suspended sediment concentrations at levels of 100 mg/L or greater has shown reduced survival of juvenile rainbow trout (Herbert and Merkens 1961), and sediment covered spawning gravels decreases the survivability of young fish during the incubation and emergence period (Bash, Berman, and Bolton 2001). Additionally, chronic turbidity during emergence and rearing of young anadromous salmonids could affect the quantity and quality of fish production (Sigler, Bjorn, and Forest 1984). Sediment can also alter the hyporheic conditions, reducing ground water flows and increasing water temperature (Poole and Berman 2001).

Surface fines can impair benthic species and fisheries by limiting the interstitial space used for protection and suitable substrate for nest or redd construction. Certain primary food sources for fish, including Ephemeroptera, Plecoptera, and Trichoptera species

(EPT), respond positively to a gravel-to-cobble substrate (Waters 1995). Substrate surface fine targets are difficult to establish. However, as described by Relyea, Minshall, and Danehy (2000), macroinvertebrates (Plecoptera) that are sediment-intolerant are found primarily where substrate cover is larger than 6 mm in size and less than 30% fines. More sediment-tolerant macroinvertebrates are found where the substrate cover is less than 6 mm in size and greater than 30% fines.

Most sediment studies have focused on smaller, A, B, and C channel-type streams (Rosgen 1996). Studies conducted on Rock Creek in Twin Falls County, Idaho, and Bear Valley Creek in Valley County, Idaho, found that embryo survival is impaired when fines exceed 30% (Idaho DEQ 1990). Overton et al. (1995) found natural accumulation of percent fines were about 34% in C channel types. Most C channel types exhibit similar gradient as F channel types, <2.0% (Rosgen 1996).

The smallmouth bass (*Micropeterus dolomieui*), which are found throughout the Weiser River Watershed, require adequate substrate for nest building. This substrate can be either sand or gravel (Simpson and Wallace 1982).

The sucker species found in the area (*Catostomus macrohelus*) prefer gravel to rocky substrate.

The northern pike minnow (*Ptychocheilus oregonensis*) uses streams and rivers for spawning activity but is more of a broadcast spawner than nest builder (Simpson and Wallace 1982).

Sculpin (*Cottus baird*) are also known to inhabit waters in the Weiser River Watershed. Sculpin prefer clean water and clean gravel for habitat.

Salmonid species require clean, well-oxygenated gravels for spawning, incubation, and emergence. Intergravel space is required for fry development, primary food sources, and refuge. Pools are required for mature fish development and provide areas of refugia during high water temperature and for prey protection (Burton 1991)

Table 18. Water Quality Standards, Criteria and Literature Reviews. Weiser River Watershed.

Applicable Criteria	Citation
Narrative Criteria	
Sediment shall not exceed quantities specified in Sections 250 and 252, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350	IDAPA 58.01.02.200.08
Suspended Sediment-TSS Targets	
100 mg/L[b] Suspended Sediment	Herbert and Merkens (1961)
25 mg/L TSS Water Body Specific Criteria (e.g. East Fork Owyhee River)	State of Nevada NAC §445A.223
50 mg/L suspended sediment concentrations not to exceed 60 days and 80 mg/L suspended sediment concentrations not to exceed 14 days	Boise River SBA-TMDL (DEQ 1999*b*)
50 mg/L (Average) TSS not to exceed 28 day period	Rowe, Essig and Jessup (2003)
Turbidity-Substrate Targets	
25 NTUs[a] Site Specific Criteria for Lake Mead, Nevada	State of Nevada NAC §445A.195
25-30 NTUs	Bash, Berman, and Bolton (2001)
23 NTUs	Lloyd (1987)
25 NTUs	Sigler, Bjorn, and Forest (1984)
Substrate < 30% at 6.0 mm[c]	Rock Creek, Twin Falls County (Idaho DEQ 1990)
Substrate < 34% at 6.0 mm	Overton (1995)
Substrate < 30% at 6.0 mm	Relyea, Minshall, and Danehy (2000)

a milligrams per liter
b nephelometric turbidity units milligrams per liter
c millimeter

Water Column Sediment Target

The Weiser River water column sediment target was derived by evaluating the lower Boise River water column sediment target. As part of the lower Boise River sediment TMDL, an extensive evaluation of water column sediment conditions was completed to determine an appropriate target for the protection of cold water aquatic life and salmonid spawning. The Boise River evaluation resulted in the identification of a two-tiered sediment target of less than or equal to 50 mg/L suspended sediment concentration (SSC) for no more than 60 days (chronic events); and less than or equal to 80 mg/L SSC for no more than 14 days (acute events); both calculated as a geometric mean over the duration.

It is important to note that, while lower Boise River water column sediment target was developed as part of the lower Boise River TMDL process, the target itself is not necessarily specific to the lower Boise River. The research on which the lower Boise River sediment target is based on maintaining a self-sustaining trout community, regardless of where the community is located. As such, using the Boise River target as a starting point for the Weiser River TMDL is appropriate.

Rationale for basing the Weiser River target on TSS

As noted above, the lower Boise River water column sediment target is based on SSC, while the Weiser River target is based on TSS. Unfortunately, very little SSC data were available for the Weiser River when the TMDL effort began. However, a sufficient amount of TSS data was available. In developing a method by which the TSS data could be used, a correlation between the two variables was developed. The intent of the correlation was to determine whether TSS could be used in place of SSC. The correlation was based on paired data (data collected at the same place and time) collected during the 2003 irrigation season. During the sampling period, the correlation showed that TSS and SSC concentrations were relatively similar in the Weiser River. As such, the decision to use TSS instead of SSC was made.

Upon further review, the decision to use TSS instead of SSC makes the Weiser River target slightly less conservative than the Lower Boise River TMDL[1]. Stated another way, if a more robust data set were available through additional sampling years, the ratio of SSC to TSS would likely increase instead of remain equal. Since suspended sediment is more damaging to aquatic life than suspended solids, the target is slightly less conservative.

Recommendation for the exposure duration period

As noted above, the exposure duration associated with 50 mg/L in the lower Boise River is 60 days, while the exposure duration in the Weiser River is 30 days. Due to the likelihood (as described above) that using TSS to replace SSC as the water column sediment parameter will decrease the margin of safety in the Weiser River TMDL, the chronic exposure duration should remain 30 days. This decision will add an additional level of protectiveness to the target. However, if additional paired data shows that the TSS/SSC correlation is truly close to 1:1, a 60-day exposure duration should be reconsidered.

Recommendation for determining target compliance

While not stated in either the Weiser River TMDL or the Lower Boise River TMDL, it is generally understood that compliance with the targets would best be determined using daily concentration values. Unfortunately, a daily sampling regime does not exist in the Weiser River Subbasin, and implementing such a regime would be costly. Therefore, it is recommended that the following considerations be made to determine compliance with the targets:

1. A minimum of one sample per week should be collected over the exposure duration.

[1] During an extensive review of paired TSS and SSC data, Gray et. al (2000) found that in natural waters SSC values tend to increase at a greater rate than their corresponding paired TSS values.

2. If the environmental conditions creating the water column sediment concentrations are known to change between sampling events, the sampling frequency should be adjusted accordingly to capture the change.

Summary

Based on the information provided above, the adjusted Weiser River water column sediment target is written as follows:

> Less than or equal to 50 mg/L total suspended solids (TSS) for no more than 30 days; and less than or equal to 80 mg/L TSS for no more than 14 days; both calculated as a geometric mean over the exposure duration.

These targets represent a valid interpretation of the narrative sediment standard and will result in supporting the designated beneficial uses within the system. This two-tiered target protects the fishery and also allows consideration for naturally occurring events over which landowners and managers have little control.

Where a TMDL is required to address sediment, target selection will be discussed in Section 5.0.

Allocations

Where it is determined that designated uses are not impaired by nutrients, allocations for total phosphorus may still be required to meet targets for the Snake River – Hells Canyon TMDL (Idaho DEQ and Oregon DEQ 2004). These allocations may be established for different segments of the Weiser River and its tributaries. Section 3.2 will address allocations.

Design and Approach of the Subbasin Assessment

Two main reasons exist for analyzing the Weiser River Watershed.

1. to determine the status of the beneficial uses of the 1998 §303(d) listed water bodies.
2. to examine the nutrient load to the Snake River and the total phosphorus target assigned to the watershed through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

In examining the beneficial uses in the watershed, the first step was to examine the flow regime of the different water bodies. If a water body exhibited zero discharge for more than seven days at a time, the water body was classified as intermittent, and the appropriate WQS were applied (See Section 2.3).

Most of the water bodies listed as water quality limited in the Weiser River Watershed have designated uses, including cold water aquatic life, salmonid spawning, primary contact recreation, etc., as established in the WQS (IDAPA 58.01.02.109).Two factors were examined when determining if the designated uses were supported or not supported.

1. First, biological indicators including community structure, sensitive grouping, and trophic status were analyzed. Analysis was completed using the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002) to determine support status. If, through the use of biological indicators, it was determined a water body was supporting the designated uses it was recommended the water body be removed from the §303(d) list. However, if a water body had been placed on the 1998 Idaho §303(d) list because of non-support for recreational uses, it was evaluated further.

2. Second, if it was determined through biological assessment a water body was not supporting designated uses, water quality data and information were examined to determine if any numeric criteria were exceeded (e.g., bacteria, dissolved oxygen, temperature). If the water quality data showed exceedances of criteria it was determined the water body was not supporting its designated uses.

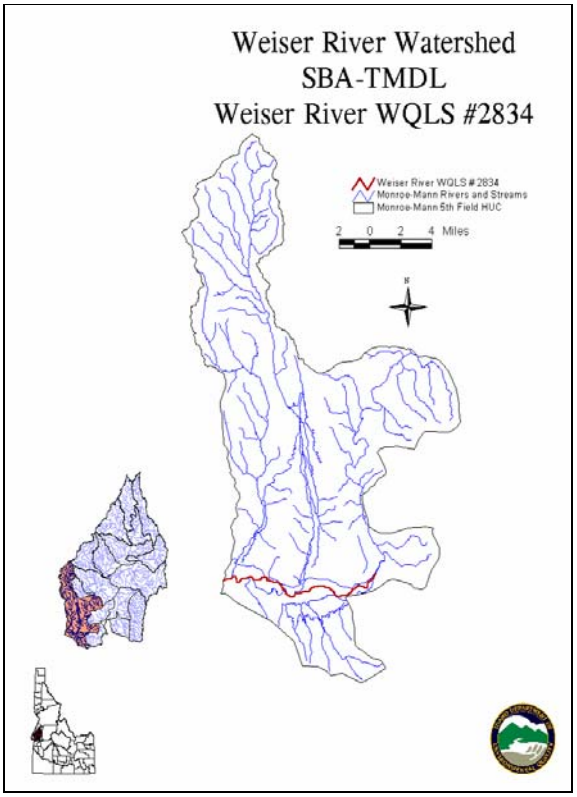
Further analysis of biological indicators is required to determine if a specific pollutant of concern is responsible for impaired designated uses. Since Idaho utilizes a narrative criterion for nutrients and sediment, it must be demonstrated these pollutants are impairing the designated uses. For example, if a stream was listed for sediment and it was determined the biological community structure is mainly composed of sediment-tolerant species; a link was established between the pollutant of concern and the biological indicators.

For nutrient analysis, dissolved oxygen levels were examined to determine if nutrients are impairing the designated uses. If dissolved oxygen levels drop below the WQS criteria for the support of cold water aquatic life, a link was established indicating that nuisance aquatic growth was causing a depletion or sag of dissolved oxygen. However, since a load allocation or target for total phosphorus has been established by the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004), a nutrient target is already established without showing impairment to a beneficial use.

For much of the Weiser River and its tributaries, concentrations and loads will be examined to determine their total phosphorus contribution to the Snake River. Appropriate load allocations will be addressed in Section 3.2.

2.5 Water Quality Status of Listed Segments

Weiser River, Galloway Dam to Snake River



Water Body	Weiser River, Galloway Dam to Snake River
Miles of impaired water body	12.4
Listed pollutants	Sediment, Temperature, Bacteria, Dissolved Oxygen, and Nutrients
Possible impaired designated uses	Cold water aquatic life and primary and secondary contact recreation
Potential sources	Streambank erosion, overland flow, animal feeding operations, wildlife, septic systems, tributary inflows, solar radiation

Discharge (Flow) Characteristics

No permanent discharge gage exists on the lower Weiser River from Galloway Dam to the Snake River. The USGS discharge gage (13266000) located near Weiser is approximately 5 miles upstream of Galloway Dam and approximately 2 miles below Crane Creek. From the gage site downstream to Galloway Dam, two major irrigation water diversions are located on the river. These two diversions are the Sunnyside Canal and the Galloway Canal. Very little discharge information is available for the Sunnyside diversion. Extensive discharge records exist from the years 1920-1996 for the Galloway Canal at USGS discharge station 13266500. Irrigation season is usually from April through September. Available discharge data and the source of that data are located in Table 19.

Diversions below Galloway Dam are few due to the incisement of the river channel. One notable diversion is located below Mann Creek. Other diversions may be occurring in the lower elevations along the river; however, there are no data that would assist in quantifying these withdrawals.

Inflows include three tributaries (Mann Creek, Monroe Creek, and Cove Creek) and four irrigation water return ditches. These ditches are the Sunnyside Canal, Frazier Gulch, Smith Drain, and Lower Payette return ditches. Other irrigation water inflow is associated with irrigated areas adjacent to the river.

Table 19. Estimated Mass Balance Discharge for Monthly Outflows (Canal Diversions) and Inflows to the Lower Weiser River. Weiser River, Galloway Dam to the Snake River.

Months	Outflows (Canals)[a] Average (cfs)[b]	In-flows Average (cfs)
May	207	197
June	222	84
July	217	70
August	199	38
September	152	25

a Based on regression analysis for USGS gage data
b cubic feet second

To complete the overall water balance, additional inflows were calculated. These inflows are located between the USGS gage station (13266000) and Galloway Dam. These additional inflows are First Creek and Bear Creek and are minor contributions to the overall flow budget for the lower Weiser River.

Table 19 shows the mass balance results. The following assumptions are built into the overall discharge mass balance: irrigation return flows remain constant and are not affected by climatic conditions; no net loss or gain exists to or from ground water (i.e., neither a losing nor a gaining reach), and data presented for in-flows are represented as normal discharge with the available data. Appendix C contains data source descriptions.

Figure 24 shows the average monthly flows that can be expected at the USGS discharge gage site (13266000). Figure 25 shows the estimated discharge budget and the discharges monitored by different agencies at various times.

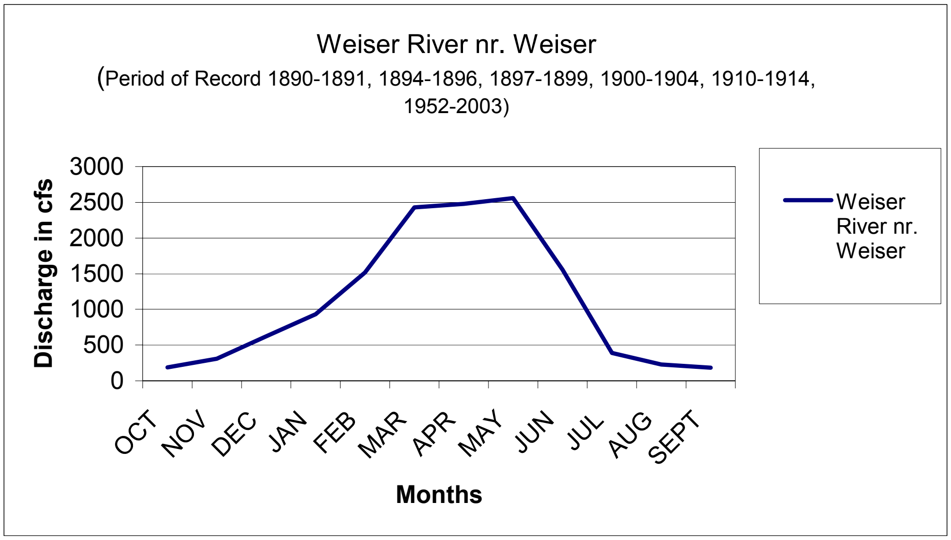


Figure 24. Historic Discharge Data. Weiser River near Weiser, ID. USGS Station ID 13266000. Weiser River, Galloway Dam to the Snake River.

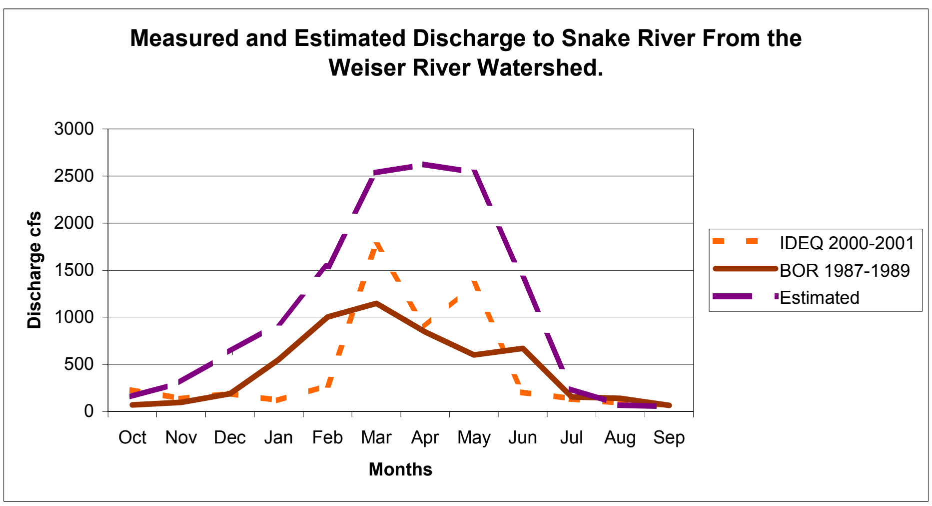


Figure 25. Measured Discharge at Highway 95 Bridge and Estimated Discharge to the Snake River. Weiser River at Weiser, ID. Weiser River, Galloway Dam to the Snake River.

Estimated flows included in Figure 25 are determined from long-term discharge data at the USGS gage site located near Weiser (15 miles upstream of the confluence with the Snake River); data from diversions of the two major canals at and above Galloway Dam; data concerning inflows from Mann Creek, Cove Creek, and Monroe Creek; and data concerning the irrigation return drains located below Galloway Dam. Inflows from below Galloway Dam to the Snake River can account for 2% to 58% of the total discharge budget to the lower Weiser River. This is dependent on time of year, with the largest contribution usually occurring late in the summer (August-September).

The data collected by DEQ (2000-2001) and the Bureau of Reclamation (BOR) (1987-1989) may only be reliable for those dates when measurements were taken. Neither set of measurements can be extrapolated to represent long-term discharge at the Weiser River site located at Weiser, Idaho, or to the Snake River.

Biological and Other Data

Since Idaho WQSs apply narrative criteria to certain pollutants, namely sediments and nutrients (IDAPA 58.01.02.200), the biological communities should be examined prior to examining water quality information. For the lower Weiser River, three biological communities were examined: periphyton, fisheries, and macroinvertebrates. The data collected on these communities will assist in determining if designated uses are impaired and if the listed pollutants are impairing those uses. Appendix C contains data source descriptions.

Periphyton

Periphyton samples were collected at three locations on the lower Weiser River. These sites included the Weiser River at the Highway 95 Bridge (WR-001), the Weiser River at Unity Bridge (WR-002), and the Weiser River below Galloway Dam (WR-003). Samples were collected by methods described in the *Idaho DEQ Beneficial Uses Reconnaissance Program* (Idaho DEQ 1998b).

Three sets of samples were collected in 2000 and 2001 at a total of eight stations on the Weiser River. Three of these sample sets were collected at sites below Galloway Dam. Samples were sent to Loren Bahls, Ph.D., operator of the laboratory Hannaea of Helena, Montana, for analysis and biological community interpretation. Dr. Bahls provided written narratives to describe species composition and structure of the periphyton communities found at these locations (Bahls 2000 and Bahls 2001).

In Idaho, periphyton has been used for biological assessments in the development of SBA-TMDLs in the South Fork Owyhee SBA-TMDL and the Upper Owyhee SBA-TMDL (Idaho DEQ 1999*c* and Idaho DEQ 2003). The use of periphyton assisted in determining if listed pollutants were impairing uses. The use of periphyton for biological assessment has been well documented as an indicator of impaired uses and the cause of that impairment (Plafkin et al. 1998 and Stevenson and Bahls 1999). Overall, the principal reasons why periphyton are appropriate indicators are as follows:

- Periphyton are present in all water bodies
- Periphyton have rapid reproductive rates
- Periphyton are primary producers
- Periphyton are easy to collect and identify with little disturbance to the ecosystem
- Periphyton have standard methods for identification and evaluation of composition and structure

- Periphyton literature and taxonomic expertise is readily available
- Public perception of periphyton growth
- Periphyton can show the level of biological integrity of an ecosystem
- Periphyton can show ecosystem stress

Dr. Bahls (2000 and 2001) described a dramatic change in structure and composition of periphyton communities from the site located above Galloway Dam to the Highway 95 Bridge site at Weiser, Idaho. The Pollution Tolerance Index declined and the Siltation Index increased indicating moderate to severe impairment and partial support to non-support of beneficial uses including cold water aquatic life. Figure 26 shows the results of the Siltation Index for the three samples from the lower Weiser River sampling sites. Figure 27 show the results for the Pollution Tolerance Index.

Figure 27 indicates that the presence of motile species have increased the Siltation Index score to the point that sediment is impairing the designated uses in the lower Weiser River. Most of the results are at or near a threshold value. Figure 27 indicates borderline or moderate impairment based on the Pollution Tolerance Index. This index may indicate the presence of high organic loading in this segment (Bahls 2000).

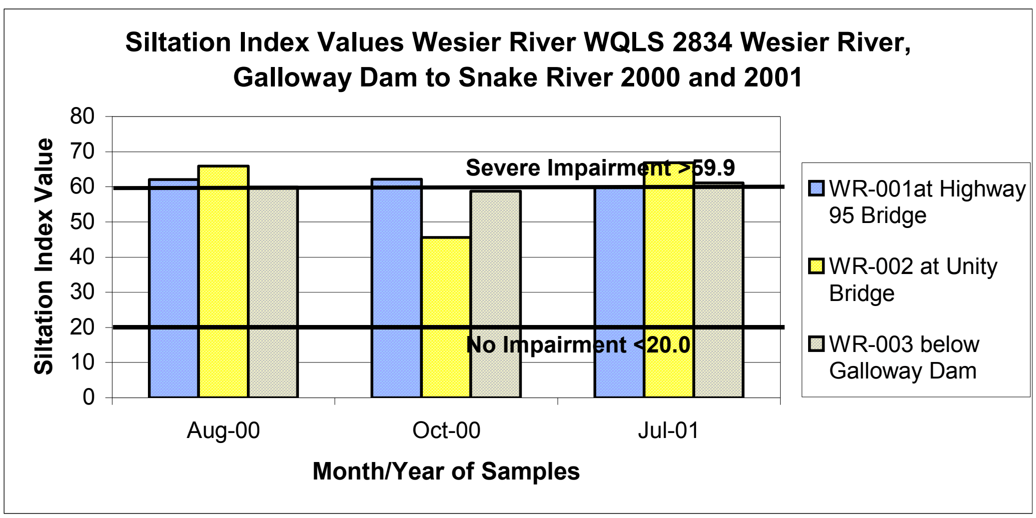


Figure 26. Siltation Index Values. Lower Weiser River. Weiser River, Galloway Dam to the Snake River.

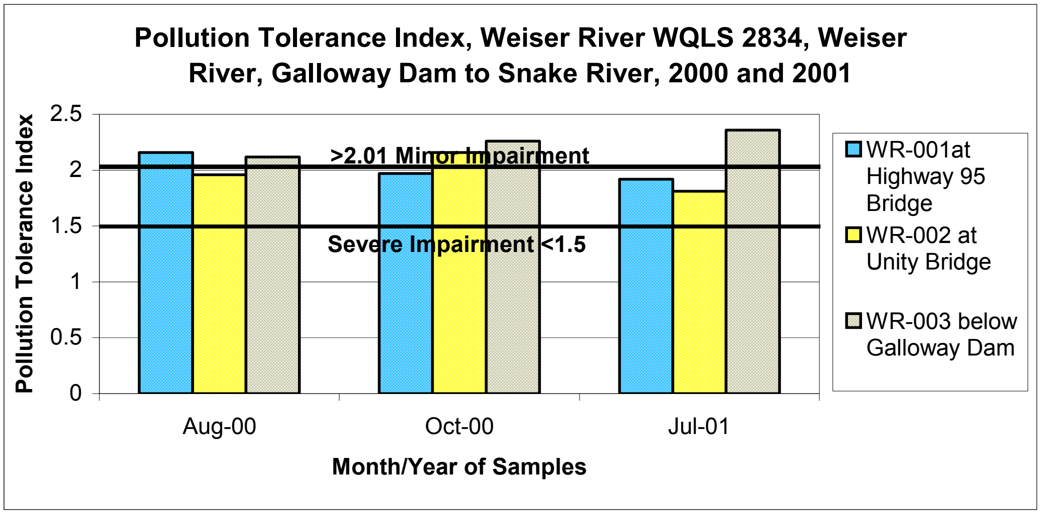


Figure 27. Pollution Tolerance Index Values. Lower Weiser River. Weiser River, Galloway Dam to the Snake River.

DEQ has developed a periphyton index scoring mechanism, called the River Diatom Index (RDI), to assist in determining support status in fourth to sixth order (medium to large) water bodies (Grafe et al. 2002). The scoring involves nine metrics, as shown in Table 20. These metrics were derived from an intensive study throughout Idaho (Fore and Grafe 2000) where different periphyton metrics were examined for community and structure based on relative disturbance (e.g., channel morphology, land use, recreational use, etc.). The nine metrics used in the RDI were selected based on statistical analysis to determine the most appropriate metrics from a total of 30 different metrics where literature has shown a response to disturbance (Grafe et al 2002 and Fore and Grafe 2000).

The results from the examination of the RDI scores for the lower Weiser River place all three stations in a Category 1. When combined with at least one other index, such as the River Macroinvertebrate Index (RMI) or River Fish Index (RFI), and the total category score is less than 2, then the water body is determined to be not fully supporting cold water aquatic life. However, for the purpose of water quality assessment in the lower Weiser River, the different metrics provide insight into the pollutants that impairing the designated uses, mainly the percent of very motile species present in the samples.

The percent of very motile species, or those species that are very tolerant of sediment, exceeds 20% at all sites in the lower Weiser River. That is, over 20% of the periphyton species found at these river locations were composed of very sediment-tolerant species. Less than 7% of the total abundance consisting of very motile species would indicate little to no human disturbances in the watershed.

Table 20. River Diatom Index Scores. Weiser River, Galloway Dam to the Snake River.

Metric	Weiser River at Highway 95 Bridge at Weiser, Idaho (Metric Score)	Weiser River at Highway 95 Bridge at Weiser, Idaho (RDI[a] Score)	Weiser River at Unity Bridge (Metric Score)	Weiser River at Unity Bridge (RDI Score)	Weiser River below Galloway Dam (Metric Score)	Weiser River below Galloway Dam RDI Score)
% Pollutant Intolerant	32.3	1	22.9	1	28.9	1
% Pollutant Tolerant	15.9	1	27.2	1	16.5	1
Eutrophic Taxa Richness	26	1	25	1	24	1
% Nitrogen Heterotrophs	36.1	1	52.1	1	38.2	1
% Polysaprobic	18.3	1	28.4	1	22.7	1
Alkaliphilic Taxa Richness	33	1	28	3	29	3
% Requiring High Oxygen	5.2	1	7.4	1	10.3	1
% Very Motile	27.8	1	21.4	3	35.5	1
% Deformed	0	5	0	5	0	5
Final River Diatom Index (RDI) Score		13		17		15
River Diatom Index (RDI) Condition Rating		1		1		1

a River Diatom Index RDI Score<22=condition rating "1" RDI Score 22-33=condition rating "2" RDI Score >34=condition rating "3"

Fisheries

Most fish species identified by the IDFG are classified as non-game species. However, at the location below Galloway Dam, 26 mountain whitefish were collected, along with two wild redband trout. Both species are classified as cold water aquatic life species and are desirable catchable species. Smallmouth bass, a cool water species, were also collected at both sites. Fewer mountain whitefish and no trout were collected at the site at Weiser, Idaho. Table 21 shows the overall synopsis of fish species found at the Galloway Dam and Weiser, Idaho sites.

Fish data collected in 1999 were evaluated using the RFI. The Galloway Dam site received a score of 39, while the Weiser, Idaho, site received an RFI score of 41. According to the *Water Body Assessment Guidance* (Grafe et al. 2002), these RFI scores are below the "threshold" limit. With this in mind, the water body would be classified as not fully supporting cold water aquatic life. Other metric scores that could be used include the RMI, the RDI, and the River Physiochemical Index (RPI). If the average score of two or more of the indices is less than 2, the system is classified as not fully supporting the cold water aquatic life use. However, since the RFI is below the threshold value, the water body would be classified as not fully supporting beneficial uses, regardless of the other scores (Grafe et al. 2002).

Table 21. Number and Percentage of Fish Species in the Weiser River at Weiser, Idaho. July 1999. Weiser River, Galloway Dam to the Snake River.

Species Found	Weiser River near Weiser, Idaho		Weiser River below Galloway Dam	
	Count	Percent of Total	Count	Percent of Total
Bridgelip sucker	17	26.2%	24	8.5%
Channel catfish	1	1.5%	0	0.0%
Chiselmouth mouth	16	24.6%	55	19.4%
Largescale sucker	1	1.5%	41	14.5%
Mountain whitefish	9	13.8%	26	9.2%
Northern pike minnow	2	3.1%	46	16.3%
Smallmouth bass	18	27.7%	55	19.4%
Speckled dace	1	1.5%	2	0.7%
Common carp	0	0.0%	13	4.6%
Longnose dace	0	0.0%	5	1.8%
Redside shiner	0	0.0%	14	4.9%
Redband trout	0	0.0%	2	0.7%
Sculpin	0	0.0%	0	0.0%
Rainbow trout	0	0.0%	0	0.0%
Mountain sucker	0	0.0%	0	0.0%
Total Number	65	100%	283	100%

Macroinvertebrates

Macroinvertebrate samples were collected at three sites on the lower Weiser River: Weiser River at the Highway 95 Bridge at Weiser, Idaho; Weiser River at Unity Bridge near Weiser, Idaho; and Weiser River at Galloway Dam. Two sets of samples were collected in 2001 and one set was collected in 2002. The samples collected in 2001 were collected in August and October. These samples were analyzed with the use of the RMI developed by DEQ (Grafe et al. 2002). The results are reported in Tables 22, 23, and 24. The results from 2002 have not been received by DEQ's Boise Regional Office.

The results from the samples collected in 2001 indicate the biological communities found at all stations from Galloway Dam to the Snake River represent good water quality. All samples were above the threshold scoring levels and received the highest condition rating score that can be obtained using the RMI (Grafe et al. 2002). However, since one of the indices is less than the threshold value (RFI), then the water body is not fully supporting the beneficial uses regardless of the other index scores.

Table 22. River Macroinvertebrate Index Scores. Weiser River at Highway 95 Bridge at Weiser, Idaho. Lower Weiser River, Galloway Dam to Snake River.

Metric	August 2001 Metric Result	August 2001 RMI[a] Metric Score	October 2001 Metric Result	October 2001 RMI Metric Score
Number of Taxa	29	5	36	5
Number EPT[b] Taxa	11	3	6	1
Percent Elmidae	0.38%	3	2.17%	5
Percent Dominate Taxa	1.52%	5	15.87%	5
Percent Predators	0.76%	1	2.17%	1
Total RMI Index Score		17		17
Condition Rating		3		3

a River Macroinvertebrate Index RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3"
b Ephemeroptera-Plecoptera-Trichoptera

Table 23. River Macroinvertebrate Index Scores. Weiser River at Unity Bridge near Weiser, Idaho. Weiser River, Galloway Dam to Snake River.

Metric	August 2001 Metric Result	August 2001 RMI[a] Metric Score	October 2001 Metric Result	October 2001 RMI Metric Score
Number of Taxa	27	5	29	5
Number EPT[b] Taxa	13	3	11	3
Percent Elmidae	4.87%	5	4.12%	5
Percent Dominate Taxa	1.69%	5	1.37%	5
Percent Predators	1.69%	1	2.55%	1
Total RMI Index Score		19		19
Condition Rating		3		3

a River Macroinvertebrate Index RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3"
b Ephemeroptera-Plecoptera-Trichoptera

Table 24. River Macroinvertebrate Index Scores. Weiser River at Galloway Dam. Weiser River, Galloway Dam to Snake River.

Metric	August 2001 Metric Result	August 2001 RMI[a] Metric Score	October 2001 Metric Result	October 2001 RMI Metric Score
Number of Taxa	36	5	32	5
Number EPT[b] Taxa	20	5	17	3
Percent Elmidae	12.36%	5	15.21%	5
Percent Dominate Taxa	18.44%	5	13.91%	5
Percent Predators	7.22%	3	5.01%	3
Total RMI Index Score		23		21
Condition Rating		3		3

a River Macroinvertebrate Index RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3"
b Ephemeroptera-Plecoptera-Trichoptera

Since the RFI score indicates the river is not supporting its beneficial uses, the high RMI score may seem irrelevant; however, the use of the individual metrics and other indices can be useful in determining what pollutant may be impairing the uses. As pointed out by Clark (2003), the presence or absence of certain Plecoptera (stonefly) species can assist in determining if sediment is a pollutant affecting the beneficial uses.

In the macroinvertebrate analysis of samples collected on the lower Weiser River, Clark (2003) noted the lack of Plecoptera species that would be classified as sediment intolerant, which indicates fine sediments are impairing the beneficial uses designated for the lower Weiser River. Most of the species analyzed by Clark indicated that fine sediment dominated the substrate in the lower Weiser River (more than 30% of the sediment was fine sediment [<6 mm]).

Water Column Data

A great deal of data has been collected on the Weiser River below Galloway Dam. These data include water chemistry data, physical data (temperature, dissolved oxygen, conductivity, etc.), discharge data, bacteria data, and pesticide data. However, most of the long-term data are associated with the USGS gage station (13266000) located above Galloway Dam. Appendix C contains information on available data that can assist in determining beneficial use support status and assist in determining load allocations for this segment.

Along with the available data, there have been two water quality status reports developed concerning this area (Clark 1985 and Tangarone and Bogue 1976). The Tangarone and Bogue study, *Weiser-Lower Payette Water Quality Surveys*, focused on only two sets of data. The first data set was collected in August 1975 and the second was collected in December of the same year. The Clark report, *Water Quality Status Report Lower Weiser River, Washington County, Idaho* (1985), focused on the 1983-1984 water year.

In the years 2000-2001, DEQ conducted a more intense study that addressed the pollutants on the 1998 §303(d) list (Ingham 2000). This study examined in closer detail the listed pollutants and the possible impacts associated with the listed pollutants. Some of the parameters selected in the 2000-2001 study focused on numeric criteria established in the WQS to support the designated uses for the segment. The parameters used to determine compliance with the established designated uses included bacteria, temperature, and dissolved oxygen. Nutrient and sediment samples were collected to assist in meeting the load allocation established by the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). The nutrient and sediment data were also collected to determine possible additional reductions that could be required after further examination of biological data and the support status of the designated uses of the Weiser River below Galloway Dam.

Each of the listed pollutants of concern will be discussed separately. Recommendations will then be made on actions to address those pollutants related to the Weiser River or to address the targets established in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

Bacteria

The lower Weiser River from Galloway Dam to the Snake River is designated for primary contact recreation (IDAPA 58.01.02.140.18.SW-1). An explanation of applicable WQS and contact recreation criteria is provided in Section 2.4.
Data collected in the years 2000, 2001, and 2002 focused on the *Escherichia coli* (*E. coli*) criteria. Those studies in 2001 and 2002 also focused on obtaining a geometric mean to determine compliance with IDAPA 58.01.02.251.01.c. Previous studies focused on the fecal coliform indicator for the support of primary and secondary contact recreation. In 2000, Idaho changed the criteria to the use of *E. coli* as the indicator for the support, or non-support, of contact recreation. It has been determined the use of *E. coli* over fecal coliform is a much better indicator for human health concerns. Also, the method used for determining fecal coliform counts resulted in numerous false positive results associated with non-fecal material.

Results obtained in 2001 and 2002 and the geometric mean data available are shown in Table 25. The data indicate that the primary contact recreation geometric mean criterion is exceeded for the two years the intensive study was conducted. The data also demonstrate that most of the segment does not support primary contact recreation. However, the geometric mean criterion is not exceeded at Galloway Dam.

Table 25. Geometric Mean *E. coli* Results, Years 2001 and 2002. Weiser River, Galloway Dam to the Snake River.

Station Location	Month and Year of Data	Number of Samples	E. coli Geometric Mean (cfu/100 ml)[a]
Weiser River at Highway 95 at Weiser, ID	August 2001	5	172
Weiser River at Galloway Dam	August 2001	5	88
Weiser River at Highway 95 at Weiser, ID (Duplicate)	August 2001	5	163
Weiser River at Highway 95 at Weiser, ID	August 2002	5	225
Weiser River at Unity Bridge	August 2002	5	202
Weiser River at Galloway Dam	August 2002	5	44

a colony forming units per 100 milliliters

Temperature

The lower Weiser River is designated for cold water aquatic life (IDAPA 58.01.02.140.18.SW-1). The presence of cold water fish, as demonstrated in Section 2.5, Table 21, indicates that cold water aquatic life is an existing use. Both mountain whitefish and wild redband trout are considered to be cold water species (Zaroban et al.1999). An explanation of temperature criteria and cold water aquatic life is presented in Section 2.4**.**

Most of the water temperature data collected prior to 2001 for the lower Weiser River were instantaneous measurements collected during monitoring events (Clark 1985 and Tangarone and Bogue 1976). In 2001, DEQ (Ingham 2000) initiated a continuous water temperature monitoring effort at two sites in the lower Weiser reach. One of the sites was near the confluence with the Snake River and the other was located at the USGS discharge monitoring site (13266000), which is upstream of this section of the river. Figures 28 and 29 show the continuous temperature results for the lower Weiser River. The temperature logger was located near the Highway 95 Bridge, at Weiser, Idaho.

In all likelihood, the three greatest influences on water temperature are warm water temperatures entering the segment, direct solar radiation, and ambient air temperature. These three influences will be examined during the development of a TMDL to address temperature. Figure 30 shows the possible influence ambient air temperature may have on water temperature. Figure 31 shows water temperature from above the segment.

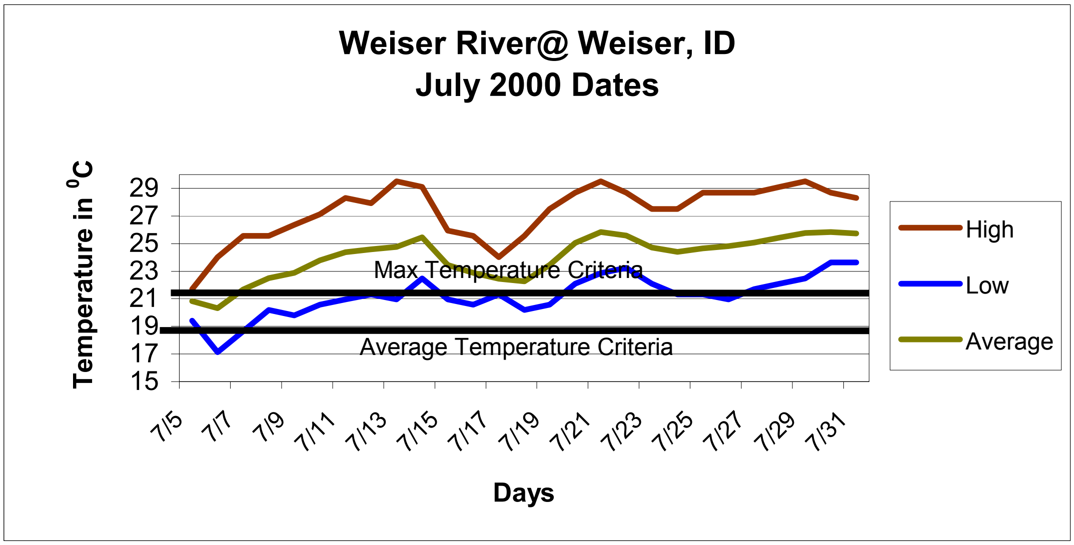


Figure 28. Water Temperature, Weiser River at Weiser, Idaho. July 2000. Weiser River, Galloway Dam to the Snake River.

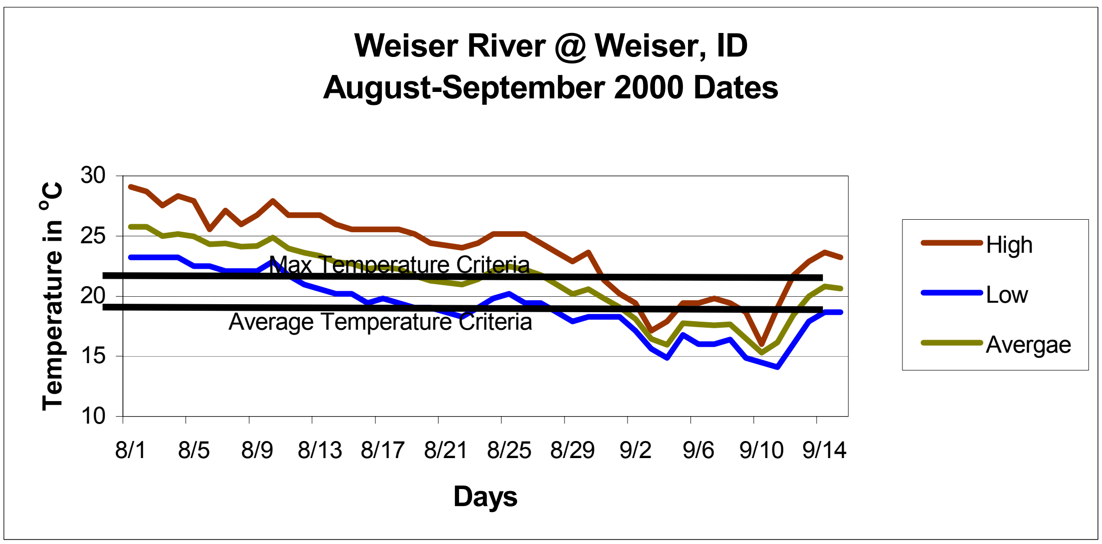


Figure 29. Water Temperature, Weiser River at Weiser, Idaho. August-September 2000. Weiser River, Galloway Dam to the Snake River.

Both graphs presented above show that both the maximum daily temperature and maximum daily average criteria are exceeded, and in most cases these exceedances occur for 100% of the measurements.

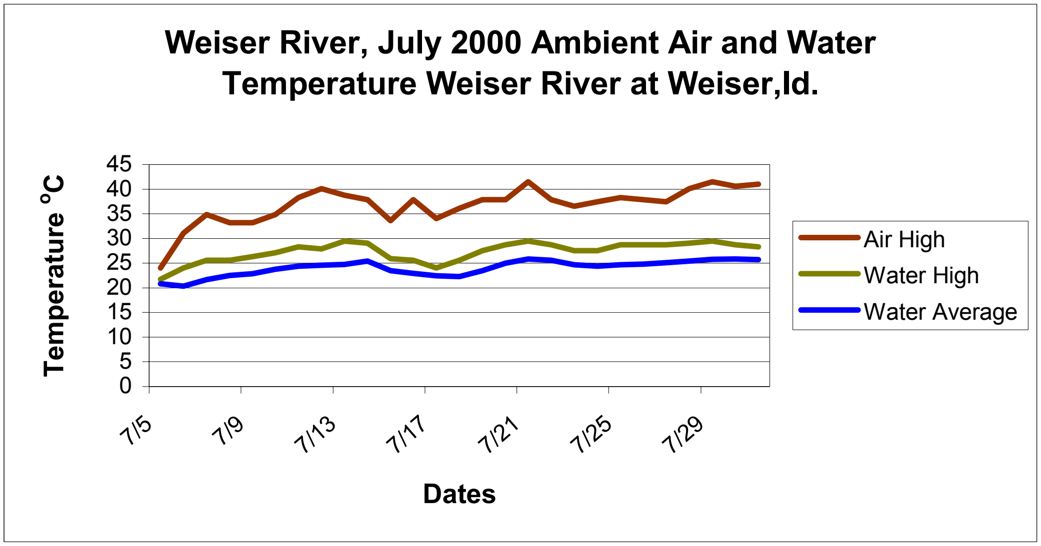


Figure 30. Ambient Air and Water Temperature. Weiser River at Highway 95 Bridge, Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

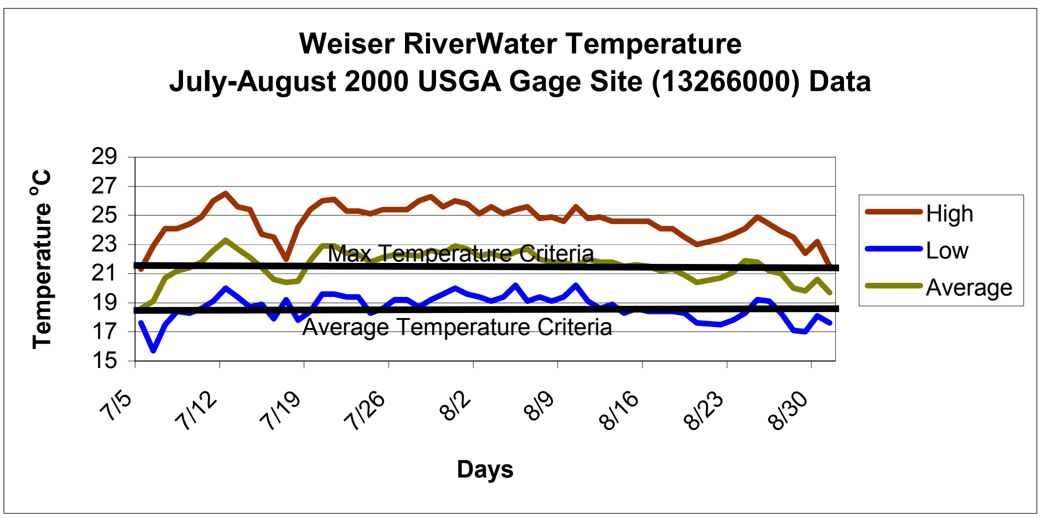


Figure 31. Water Temperature. Weiser River at USGS Gage No. 13266000 near Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

As demonstrated in both graphs presented above, ambient air temperature and water temperature from upstream sources both play a role in warmer water temperatures in the lower Weiser River. See the Addendum to the Weiser River Subbasin Assessment and TMDL for information about the Potential Natural Vegetation (PNV) temperature TMDL.

Dissolved Oxygen

Cold water aquatic life is a designated use in the lower Weiser River (IDAPA 58.01.02.140.18.SW-1). With this designation, numeric criteria apply to protect this use. An explanation of how the dissolved oxygen criteria are applied to cold water aquatic life is presented in Section 2.4.

Historic water column dissolved oxygen monitoring conducted by BOR from 1987 to 1989 showed that 12.5% of the samples collected during the period dropped below the minimum concentration established in the WQS. Instantaneous dissolved oxygen measurements were taken at the time of the sampling event. Figure 32 shows the results from the 1987-1989 monitoring events.

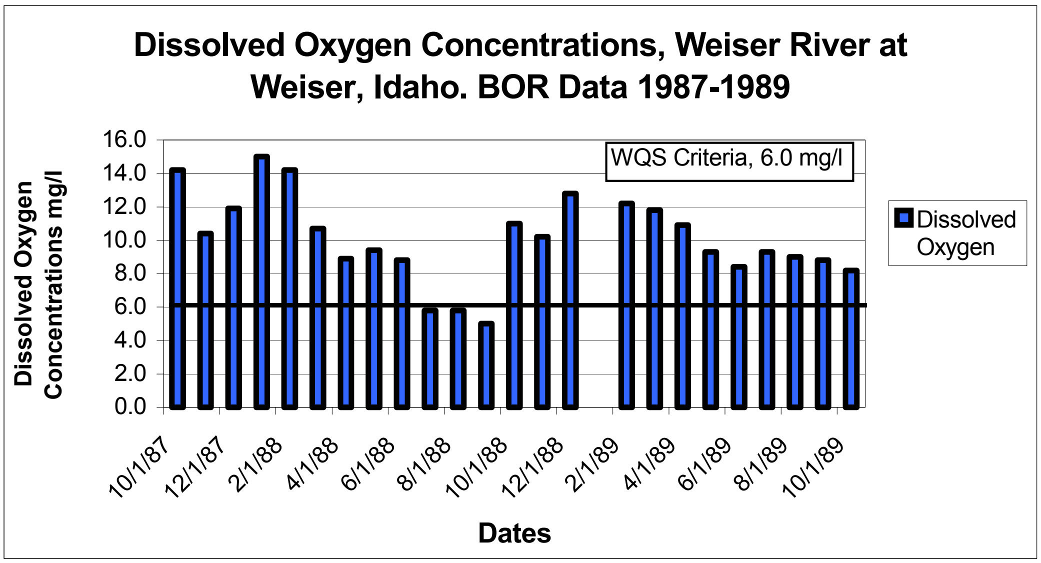


Figure 32. Instantaneous Dissolved Oxygen Results, BOR 1987-1989. Weiser River at Highway 95 Bridge at Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

In 2000, DEQ conducted intensive water quality monitoring on many water bodies in the Weiser River Watershed. This monitoring included both instantaneous and diel dissolved oxygen monitoring. Figure 33 shows the results from the 2000 instantaneous dissolved oxygen monitoring effort. Figure 34 shows the results from the diel dissolved oxygen monitoring conducted during a 24-hour period on August 14 and 15, 2000.

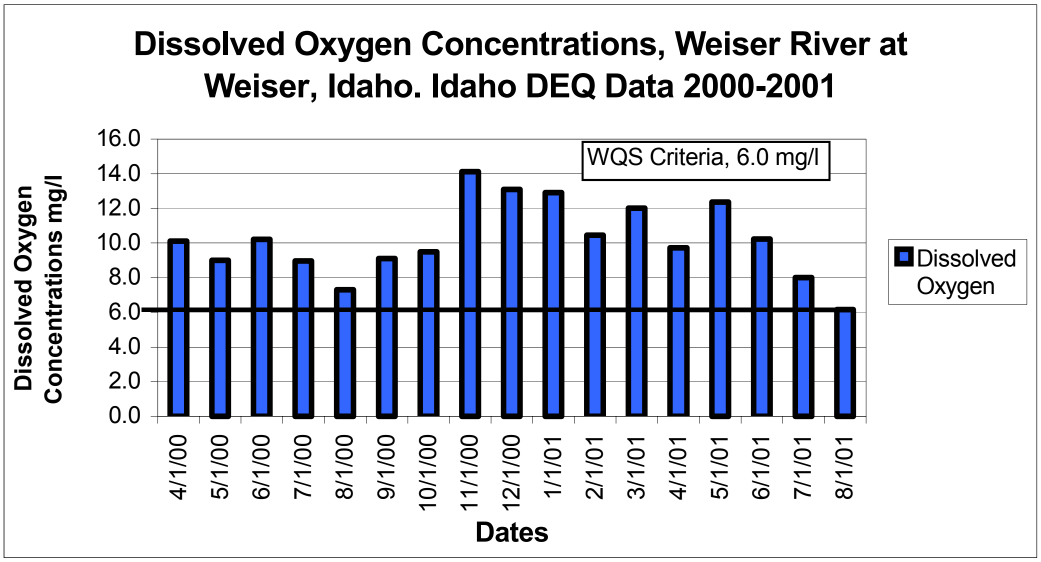


Figure 33. Instantaneous Dissolved Oxygen Results, DEQ 2000. Weiser River at Highway 95 Bridge at Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

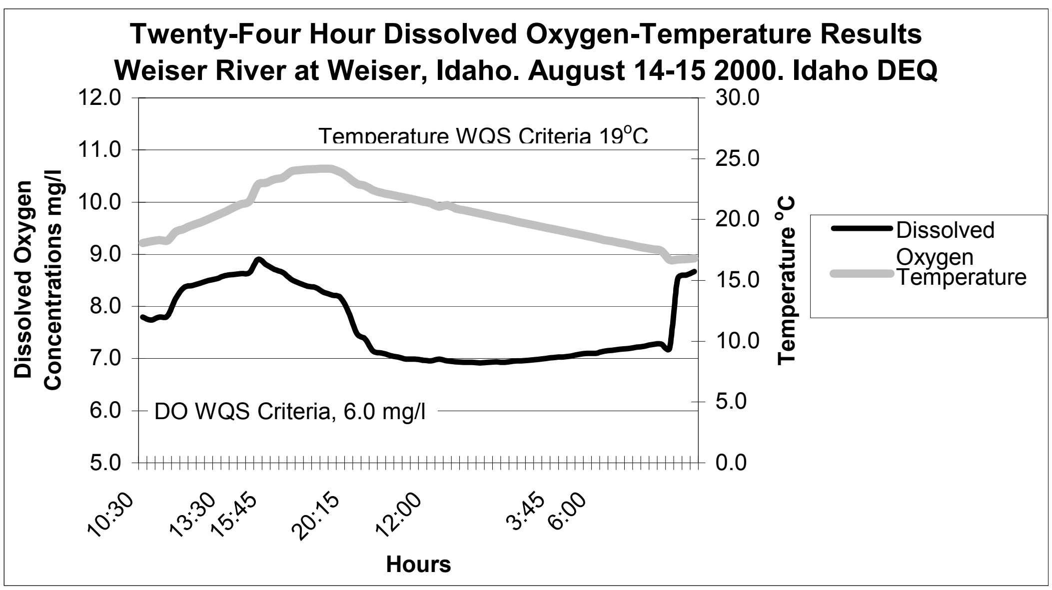


Figure 34. Diel Dissolved Oxygen Results, DEQ 2000. Weiser River at Highway 95 Bridge at Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

The 2000 data collected by DEQ showed one period when the dissolved oxygen level dropped below the WQS criterion for the protection of cold water aquatic life. This represented 5% of the total number of instantaneous measurements collected in 2000 and 2001.

To fully understand dissolved oxygen's reaction to the environment, 24-hour monitoring should be conducted. Diel monitoring can assist in identifying the possible cause of dissolved oxygen saturation or dissolved oxygen sags. The results displayed in Figure 34 show dissolved oxygen sags, which could be associated with aquatic plant growth. That is, when water temperatures were dropping, water column dissolved oxygen concentrations should have been rising due to increased saturation potential at lower temperatures. However, this was not the case, so other factors were considered. Since dissolved oxygen levels sagged during the period of respiration and once again rose during periods of photosynthesis (daylight hours), algae growth could be affecting water column dissolved oxygen levels. However, other factors can contribute to dissolved oxygen fluctuations as well, such as biochemical oxygen demanding materials and chemical oxygen demanding materials.

DEQ diel monitoring conducted in 2000 took place during a historic low-flow period and during the hottest part of the summer months. Although dissolved oxygen concentrations sagged, they never dropped below the critical level of 6.0 mg/L. Dissolved oxygen readings were never at a point that would have had detrimental impacts to the biological communities in the Weiser River. Additionally, no significant fish kills have ever been reported on the Weiser River. Low dissolved oxygen is often the cause of fish kills in lotic ecosystems (e.g., in the Snake River in 1990).

A review of the complaint log at DEQ's Boise Regional Office could not locate any complaints concerning odors or concerns about aesthetic value. There have been no health warnings issued that could be associated with aquatic growth.

Nutrients

Unlike the constituents discussed above, there are no numeric criteria WQS for nutrients. The WQS for nutrients is a narrative criterion as described in IDAPA 52.01.02.200.06 under the general surface water criteria, IDAPA 52.01.02.200. Further explanation the nutrient criterion is located in Section 2.4.

Decreased dissolved oxygen can be an indicator of excess nutrients in the water column. This is especially true during diel evaluations. The dissolved oxygen concentrations decreased at night, indicating that respiration of aquatic plants was occurring. However, with the decrease in water temperature during the same period, higher dissolved oxygen levels should have been noted due to increased saturation potential. The data indicate the presence of aquatic plant growth in the Weiser River, but the diel dissolved oxygen survey did not indicate the aquatic plant growth was at a level that could be classified as a nuisance and/or at levels that impair the designated uses.

Although it has been determined that nutrients are not impairing the designated uses in the lower Weiser River, it has been determined that nutrients entering the Snake River from the Weiser River Watershed are contributing to the impairment of the Snake River's beneficial uses. The *Snake River-Hells Canyon SBA TMDL* (Idaho DEQ and Oregon DEQ 2004) has identified phosphorus as the nutrient of concern originating from the

Weiser River Watershed and other watersheds discharging to the Snake River. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has set a total phosphorus target of 0.07 mg/L to prevent eutrophic conditions. This target has also been assigned to the major tributaries to the Snake River in southwestern Idaho and eastern Oregon (i.e., Payette River, Boise River, Malheur River, Owyhee River, and Weiser River). Current total phosphorus levels in the Weiser River exceed the total phosphorus target of 0.07 mg/L.

Using historic flow and total phosphorus data The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2002) has established a load allocation for total phosphorus at 144 kilograms per day (kg/day), which is an average concentration of 0.07 mg/L total phosphorus. This is an approximate 63% reduction from current loading. This load reduction applies during the period from May through September. This period has been identified as the critical period to prevent nuisance aquatic growth in the Snake River and Brownlee Reservoir.

One purpose of this SBA is to examine, in more detail, existing water quality data and refine the Snake River total phosphorus load allocation assigned to the Weiser River. Discussion of possible load allocations from the lower Weiser River is found in Section 3.2.

Sediment

As demonstrated in the biological assessment of the lower Weiser River, sediment is impairing the designated cold water aquatic life use. The WQS address sediment through narrative criteria in IDAPA 58.01.02.200.8; this is discussed in detail in Section 2.3.

The biological assessment has determined that sediment is impairing the designated uses. This impairment is based on the presence of sediment tolerant and/or the absence of sediment intolerant species. The periphyton species present indicated an abnormally high percentage (>20%) of motile species that are tolerant of sediment. The lack of sediment intolerant macroinvertebrate species also indicates sediment is impairing the designated uses.

Total suspended solids (TSS) and suspended sediment concentrations varied for the four different years that data are available for the Weiser River below Galloway Dam (See Table 26). Suspended sediment concentrations were only monitored in 1983 (Clark 1985). Except for trend water quality monitoring conducted by the USGS, all other studies focused on TSS. An intensive study and comparison of suspended sediment and TSS showed that the analytical method used for TSS may underestimate the total sediment load (Gray et al. 2000).

Table 26. Total Suspended Solids and Suspended Sediment Results for Weiser River at the Highway 95 Bridge at Weiser, Idaho, and at Unity Bridge near Weiser, Idaho, 1983, 1988-1989, and 2000-2001.

	Weiser River Highway 95 at Weiser, Idaho 1988 TSS[a] (mg/L)[b]	Weiser River Highway 95 at Weiser, Idaho 1989 TSS (mg/L)	Weiser River Highway 95 at Weiser, Idaho 2000 (Apr-Sep) TSS (mg/L)	Weiser River Highway 95 at Weiser, Idaho 2001 TSS (mg/L)	Weiser River at Unity Bridge near Weiser, Idaho 1983 SS[c] (mg/L)
Average	16	33	39	34	47
Standard Deviation	11	34	18	44	59
Maximum	37	145	64	160	229
Minimum	4	1	10	2	4

a Total Suspended Solids
b Milligrams per Liter
c Suspended Sediment

With the data available for the years shown in Table 26, a sediment rating curve was developed to evaluate TSS loads and concentrations throughout the calendar year based on the function of discharge. The TSS data were normalized into natural log values. The regression analysis for the measured TSS and discharge are shown in Figure 35.

The use of normalized data is used to adjust for the high variability of discharge that can occur in the watershed from year to year. The data were addressed in this fashion to assist in predicting what the average, or normal, discharge would have on loading analysis. Most of the analysis of the actual discharge measurements and loads compared to the normalized discharge and loads showed that the normalized data had a less square root error than what was found on the actual results.

The first step in the analysis was to calculate the sediment load based on the flows and TSS concentrations recorded for the date samples were collected. With available average daily discharge recorded at the USGS site 12 miles upstream and a water budget developed for outflows and inflows, an overall estimated discharge to the Snake River was calculated. This estimated daily discharge value was then applied to the sediment rating curve developed for the Highway 95 Bridge site.

$$\ln(y) = 1.6351\ln(x)$$
$$r^2 = 0.6775$$

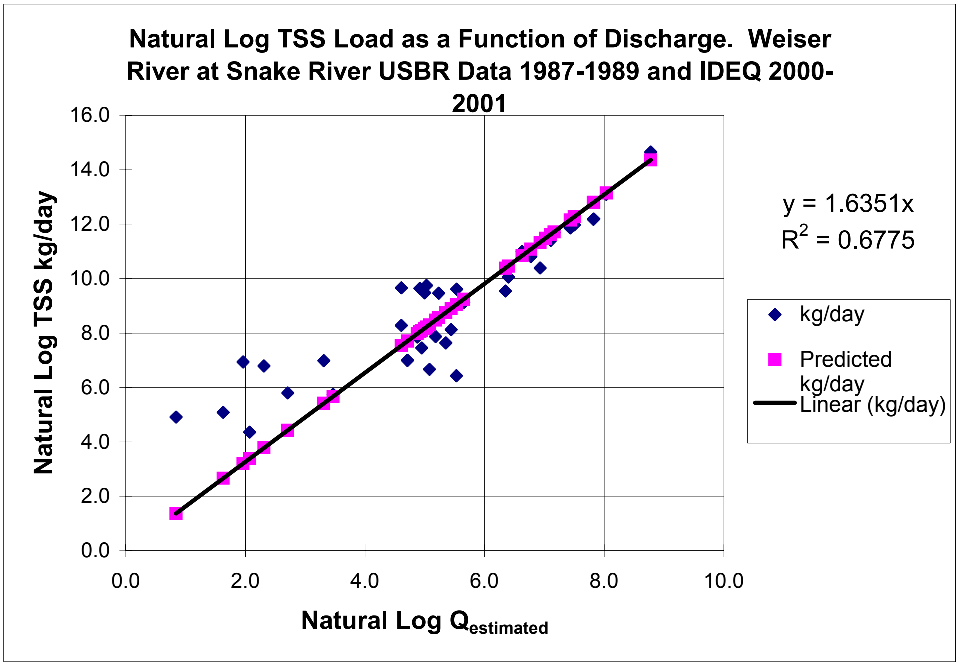


Figure 35. Natural Log Plots for Measured Total Suspended Solids Load (Y axis) as a Function of Measured Flows (X axis). Weiser River, Galloway Dam to the Snake River.

The value obtained as the estimated suspended sediment-solids load for that day's normal (average) flow is shown as **y**. The variable ln**(x)** is the natural log value for the average (normal) flow for that date. So, the estimated suspended sediment load would appear as:

TSS Load ln(y) = 1.6351ln(x) or

TSS Load (y) = exp (1.6351n(x))

As an example, for the date July 26, 2000, the following natural log values were obtained:

Measured TSS = 46 mg/L

Natural Log Measured Discharge = 5.7301 (308 cfs)

Natural Log Measured TSS Load = 10.4533 (34,657 kg/day)

For July 26, the estimated discharge, TSS load, and concentration would be:

Natural Log Average Daily Discharge (Budget) = 4.6674 (106 cfs)

Estimated TSS Load = 2,063 kg/day

Estimated TSS Concentration = 8 mg/L

The values presented in Table 27 show the statistical analysis for the dates when actual monitoring was conducted. The results presented in Table 28 are the monthly and overall average values when the sediment rating curve was applied to all the normalized discharges for one year. The results from the sediment rating curve model provide a more detailed monthly sediment analysis and even a more detailed daily load and concentration analysis. However, the results from the modeling effort may underestimate high-yield slugs of TSS associated with the rising hydrograph and/or storm events. The sediment curve rating may equally overestimate long- and short-term TSS averages. These over/under estimations will be examined in more detail in the development of a TMDL for this parameter.

Table 27. Measured and Estimated Discharge, Total Suspended Solid Loads, Total Suspended Solids Concentration, and Error Bias. Weiser River, Galloway Dam to the Snake River.

	Measured Discharge (cfs)[a]	Measured TSS[b] Concentrations (mg/L)[c]	Measured TSS Load (kg/day)[d]	Estimated Discharge (cfs)	Estimated TSS Concentration (mg/L)	Estimated TSS Load (kg/day)
Average	841	28.5	83,069	1,002	26.0	103,971
Standard Deviation	1,281	33.0	157,616	947	18.0	125,791
Maximum	6,577	160.0	917,377	2,695	54.7	360,428
Minimum	48.0	1.0	989	6.3	1.3	20
Count	42	42	42	42	42	42
					Square Root Error	1,038,467
					% Difference Measure	10.6%
					% Difference Estimated	10.0%

a cubic feet per second
b total suspended solids
c milligrams per liter
d kilograms per day

Table 28. Estimated Monthly Discharge and Total Suspended Solids Loads and Concentrations for Weiser River at the Highway 95 Bridge at Weiser, Idaho. Weiser River, Galloway Dam to the Snake River.

	Estimated Discharge at Snake River (cfs)[a]	Estimated TSS[b] Concentrations at Snake River (mg/L)[c]	Estimated TSS Loads at Snake River (kg/day)[d]
Oct	186	14.0	6,413
Nov	308	19.5	15,470
Dec	615	31.3	48,753
Jan	927	41.0	99,155
Feb	1,536	57.5	235,780
Mar	2,409	79.0	470,904
Apr	2,488	80.9	492,982
May	2,547	82.2	512,739
June	1,550	58.1	234,926
July	388	22.7	23,385
Aug	227	16.0	8,928
Sep	181	13.7	6,086

a cubic feet per second
b total suspended solids
c milligrams per liter
d kilograms per day

Substrate Sediment

As discussed in Section 2.4, substrate composition will affect biological communities and structure. In August 2003, DEQ evaluated the substrate at three locations on the lower Weiser River. Table 29 shows the percentage of the substrate that is less than 6.0 mm in size.

Table 29. Percent Substrate Less Than 6 Millimeters in Size. Weiser River, Galloway Dam to the Snake River.

	Weiser River at Highway 95 Bridge at Weiser, Idaho	Weiser River at Unity Bridge near Weiser, Idaho	Weiser River below Galloway Dam	Average for Segment
Percent of Substrate Less than 6 mm in Size	74.8%	29.9%	20.3%	41.7%

Status of Beneficial Uses

Both the narrative and numeric criteria were examined for the listed pollutants of concern to determine beneficial use support status in the Weiser River. A biological assessment was conducted and compared to indices developed and published in the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). Further analysis of the biological communities revealed that the pollutants of concern listed in the 1998 Idaho §303(d) list are impairing the designated uses established for the lower Weiser River. Table 30 provides information on the final assessment and status of the designated beneficial uses.

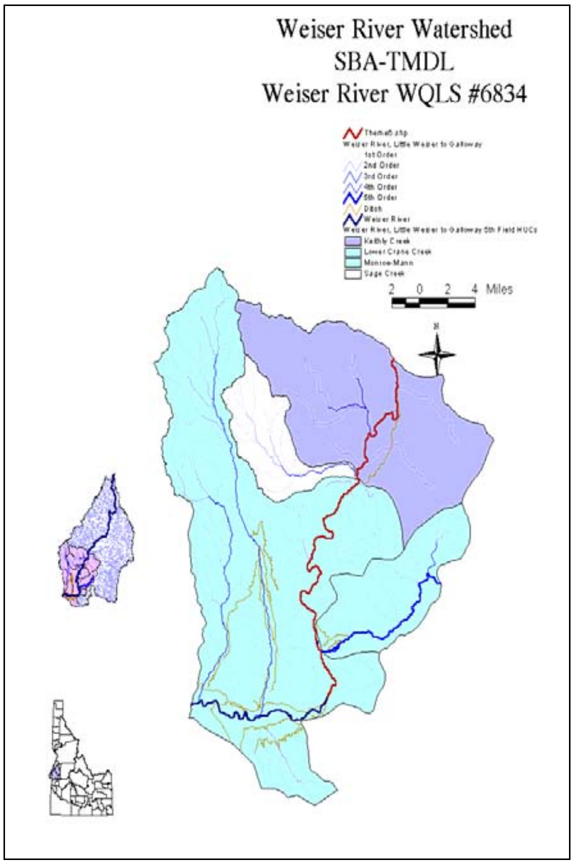
Table 30. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Lower Weiser River at Confluence with Snake River. Weiser River, Galloway Dam to the Snake River.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendations
Cold Water Aquatic Life	Not Supported	Temperature and Sediment	Numeric Criteria Exceeded for Temperature; Biological Assessment Indicated Impairment for Sediment	Develop TMDL to Address Temperature. Develop TMDL to Address Sediment. Develop Total Phosphorus Allocations.[a]
Primary Contact Recreation	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Secondary Contact Recreational	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Drinking Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

In addition to the designated uses for the lower Weiser River, nutrient targets have been established through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Although evaluation and modeling for total phosphorus in the lower Weiser River have shown a reduction, levels must be decreased further in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). A discussion of the total phosphorus load allocation is located in Section 3.2.

Weiser River, Little Weiser River to Galloway Dam



Water Body	Weiser River, Little Weiser River to Galloway Dam
Miles of impaired water body	20.9
Listed pollutants	Sediment, Bacteria, and Nutrients
Potential Impaired designated uses	Cold water aquatic life and primary contact recreation
Potential sources	Overland flow, irrigated induced erosion, stream bank erosion, animal feeding operations, wildlife, septic systems

Discharge (Flow) Characteristics

The USGS discharge gage (13266000), located near Weiser, is approximately 5 miles upstream of Galloway Dam and approximately 2 miles below Crane Creek. Diversions are limited to one in-river diversion located approximately 20 miles upstream of the gage site and approximately 5 miles downstream of the confluence with the little Weiser River. Major tributaries to this section of the Weiser River include the Little Weiser River, Sage Creek, Keithly Creek, and Crane Creek. Crane Creek has the most impact to late season flows due to irrigation water releases from Crane Creek Reservoir. Figure 36 shows the normalized discharge recorded at USGS Gage No.13266000 and above Crane Creek at historic USGS Gage No. 132585000. Appendix C contains information on data sources and descriptions of current and historic discharge measurements for middle Weiser River.

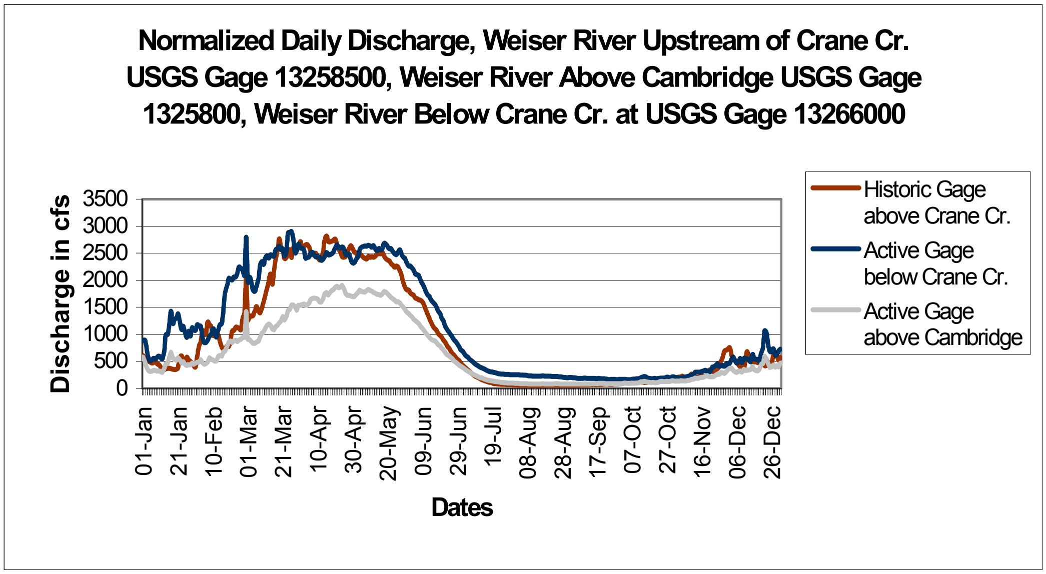


Figure 36. Normalized Average Daily Discharge at USGS Gage No. 13266000, Historic Discharge Weiser River above Crane Creek at USGS Gage No. 13263500, and above Cambridge at USGS Gage No. 13258500. Weiser River near Weiser, ID.

Of the inflow tributaries, Sage, Keithly, and Crane Creeks and the Little Weiser River, only Crane Creek has an active USGS discharge gage (13265500). Historic discharge data are available for two sites, one on the Weiser River upstream of Crane Creek (1363500) and the other on the Little Weiser River near the confluence. Crane Creek is the only tributary to the Weiser River Watershed other than Mann Creek that could be classified as a regulated water body.

Irrigation water is stored in Crane Creek Reservoir and released for late season irrigation water that is diverted from the Weiser River via the Sunnyside and Galloway Canals. A USGS site (13258500) that is currently maintained near Cambridge offers discharge data upstream of the Little Weiser River (See Figure 36). Figure 37 shows the discharge from the two major tributaries (Crane Creek and Little Weiser River), the increased discharge associated with irrigation water demand from the Crane Creek Watershed (Crane Creek Reservoir), and an earlier seasonal peak discharge occurring in the Crane Creek Watershed compared to the Little Weiser Watershed.

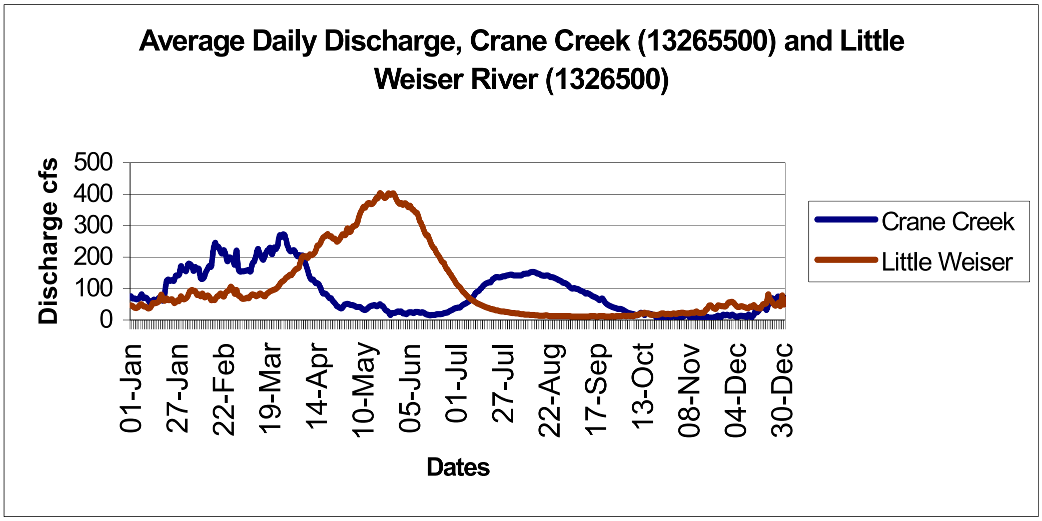


Figure 37. Normalized Average Daily Discharge at USGS Gage No. 13265500 (Crane Creek) and Historic Discharge from USGS Gage No. 1326500 (Little Weiser River).

Biological and Other Data

Since Idaho WQSs apply narrative criteria to certain pollutants, namely sediments and nutrients (IDAPA 58.01.02.200), the biological communities should be examined prior to reviewing water quality information. For the Weiser River, three biological communities were examined: periphyton, fisheries, and macroinvertebrates. The data collected on these communities will assist in determining if designated uses are impaired and if the listed pollutants are impairing those uses.

Periphyton

Periphyton samples were collected at three locations on the middle Weiser River: Weiser River above Crane Creek (WR-004), Weiser River above Midvale (WR-005), and Weiser River below the confluence with the Little Weiser River (WR-006). Samples were collected by methods described in *Idaho DEQ Beneficial Use Reconnaissance Project* (Idaho DEQ 1998*b*). A site below Galloway Dam (WR-003) also received monitoring. Although WR-003 is not within listed segment 6834, it does provide information on the expected periphyton communities in the Weiser River below Galloway Dam (WR-003). The only substantive difference that would be expected between the segments downstream and upstream of Galloway Dam is a difference in discharge. This primarily would impact habitat.

Samples were collected in 2000 and 2001 at a total of eight stations on the Weiser River. Samples were sent to Loren Bahls, Ph.D., (Hannaea) of Helena, Montana, for analysis and biological community interpretation. Dr. Bahls provided written narratives to describe species composition and structure of the periphyton communities found at these locations (Bahls 2000 and Bahls 2001).

Dr. Bahls (2000 and 2001) described a dramatic change in structure and composition of periphyton communities from the site located above Crane Creek to the Highway 95 Bridge site at Weiser, Idaho. Pollution Tolerance Index scores declined and Siltation Index scores increased indicating moderate to severe impairment and partial support to non-support of beneficial uses including cold water aquatic life for sites below Galloway Dam. It may be extrapolated that the biological communities found directly below Galloway Dam can also be found directly above; that is, the only difference above and below the dam is the amount of discharge. It is not expected that concentrations of pollutants would change. However, the overall pollutant load would decrease due to diversion of water to irrigation canals. Figure 38 shows the results of the Siltation Index for the three samples from the middle Weiser River sampling sites. Figure 39 show the results for the Pollution Tolerance Index.

Figure 38 indicates an increase the Siltation Index scores below Galloway Dam. However, the index does not indicate non-support due to sediment. The index showed minor to no impairment to the periphyton communities upstream of Crane Creek. Below the confluence with Little Weiser River, the Siltation Index showed a slight increase in the index value, indicating slight to minor impairment of the periphyton communities.

For the Pollution Tolerant Index (Figure 39), the scores indicated minor to no impairment for the Weiser River site above Crane Creek. Below Little Weiser River, the Pollution Tolerant Index indicated excellent conditions to slight impairment.

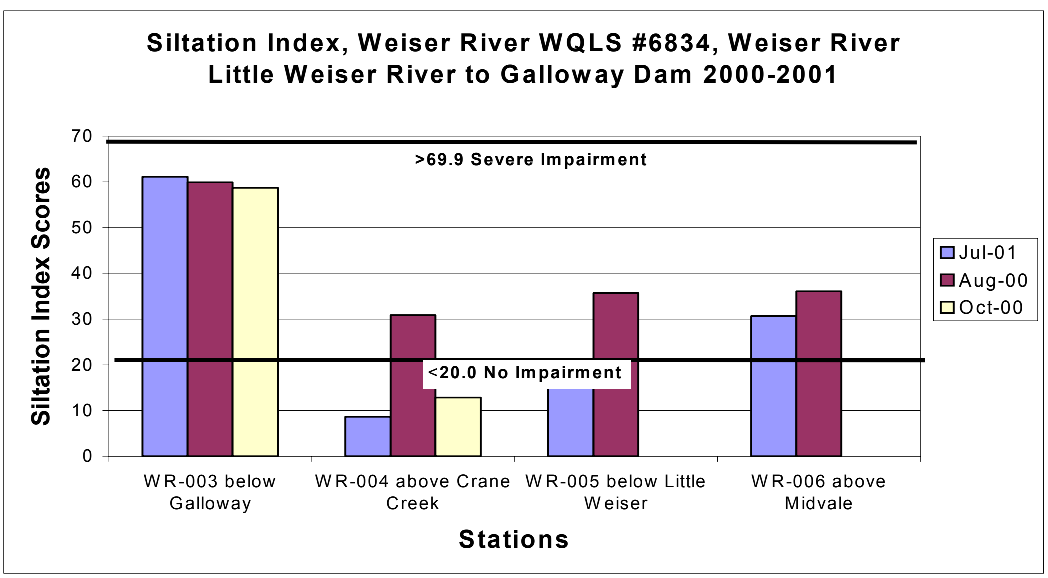


Figure 38. Siltation Index Values. Middle Weiser River. Weiser River, Little Weiser River to Galloway Dam.

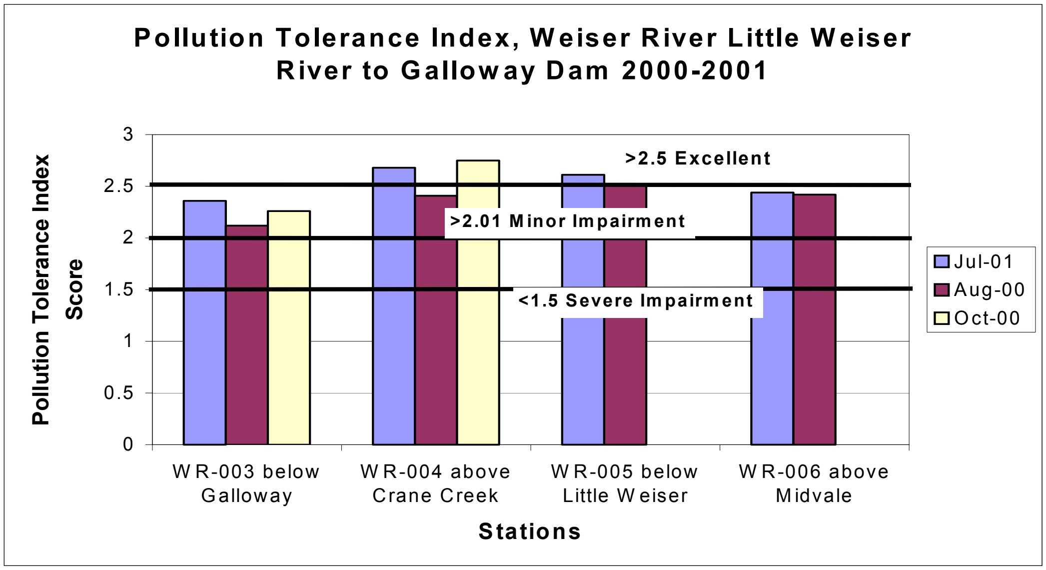


Figure 39. Pollution Tolerance Index Values. Middle Weiser River. Weiser River, Little Weiser River to Galloway Dam.

The results from the examination of RDI scores for the middle Weiser River showed mixed results for the four stations evaluated with the 2000 periphyton data (Table 31). To get a better picture of the water quality, the RDI should be looked at with other index scores. When combined with at least one other index, such as the RMI or RFI, if the total category score is less than 2, then the water body is determined to be not fully supporting cold water aquatic life.

Effects of Temperature on Periphyton

All species of algae have a temperature range under which they can reach optimum biomass. The range for temperate species, such as the diatoms found throughout Southwest Idaho, is 15 ^{o}C to 30 ^{o}C (Hustedt 1956). Temperatures below the optimum range may cause a decrease in community composition and abundance. Temperatures above the optimum range (>30 ^{o} C) often leads to a complete shift in the algal community, whereby diatoms are replaced by blue-green algae (Patrick 1969).

Water temperatures in the Weiser River from the Little Weiser River to the Snake River fluctuate according to the season. The water is relatively cool in the spring, but when algal communities are developing in the late spring and in the summer, water temperatures routinely reach and exceed 24 ^{o}C. Despite this trend, water temperatures rarely deviate from the range 15 ^{o}C to 30 ^{o}C during the growing season. As a result, it is unlikely that water temperature (whether it be too hot or too cold) limits algae growth in the Weiser River.

Table 31. River Diatom Index Scores. Weiser River, Little Weiser River to Galloway Dam.

Metric	Weiser River below Galloway Dam Metric Score	Weiser River below Galloway Dam RDI[a] Score	Weiser River above Crane Creek Metric Score	Weiser River above Crane Creek RDI Score
% Pollutant Intolerant	28.9%	1	46.9%	1
% Pollutant Tolerant	16.5%	1	5.7%	3
Eutrophic Taxa Richness	24	1	24	1
% Nitrogen Heterotrophs	38.2%	1	28.2%	1
% Polysaprobic	22.7%	1	19.2%	1
Alkaliphilic Taxa Richness	29	3	28	3
% Requiring High Oxygen	10.3%	1	6.4%	1
% Very Motile	35.5%	1	25.7%	1
% Deformed	0%	5	0%	5
Final River Diatom Index (RDI) Score		15		17
Final Condition Category Rating		1		1

a River Diatom Index, RDI Score<22=condition rating "1" RDI Score 22-33=condition rating "2" RDI Score >34=condition rating "3"

Table 31 (Continued). River Diatom Index Scores. Weiser River, Little Weiser River to Galloway Dam.

Metric	Weiser River above Midvale Metric Score	Weiser River above Midvale RDI Score	Weiser River below Little Weiser River Metric Score	Weiser River below Little Weiser River RDI Score
% Pollutant Intolerant	60.3%	3	53.4%	1
% Pollutant Tolerant	9.7%	3	11.1%	3
Eutrophic Taxa Richness	16	3	21	1
% Nitrogen Heterotrophs	19.5%	3	21.7%	1
% Polysaprobic	10.0%	1	17%	1
Alkaliphilic Taxa Richness	21	3	23	3
% Requiring High Oxygen	8.2%	1	11.3%	1
% Very Motile	28%	1	25.1%	1
% Deformed	0%	5	0%	5
Final River Diatom Index (RDI) Score		23		17
Final Condition Category Rating		2		1

a River Diatom Index, RDI Score<22=condition rating "1" RDI Score 22-33=condition rating "2" RDI Score >34=condition rating "3"

For the purpose of the assessment of water quality in the middle Weiser River, the different metrics also provides an insight to the pollutants impairing the designated uses. The percent of very motile species, or those species that are very tolerant of sediment, exceeds 20% at all sites in the lower Weiser River. That is, over 20% of the periphyton species found at these river locations were sediment tolerant species. If less than 7% of the total abundance consisted of very motile species, this would indicate little to no human disturbances in the watershed.

Fisheries

In 1999, IDFG conducted a fish survey on the middle Weiser River. Two sites are located in the canyon between Galloway Dam and just below Midvale. The last two locations are located in an area known as the canyon, with limited access. Cold water species were found in all locations. Table 32 shows the overall synopsis of fish species found within the canyon reach and at Midvale, Idaho. Table 21 presented data for below Galloway Dam, which also should be representative of species found directly upstream.

Fish data collected in 1999 were evaluated with the RFI. According to the *Water Body Assessment Guidance* (Grafe et al. 2002), all of the RFI scores are below the threshold limit. With this in mind, the water body would be classified as not fully supporting cold water aquatic life.

Table 32. Species Count and River Fish Index Scores, Weiser River Lower Canyon Section, Upper Canyon Section, and Near Midvale, Idaho. Weiser River Little Weiser River to Galloway Dam.

Species Found	Weiser River, Lower Canyon		Weiser River, Upper Canyon		Weiser River near Midvale, Idaho	
	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total
Bridgelip sucker	9	6.0%	22	8.7%	5	3.8%
Channel catfish	0	0.0%	0	0.0%	0	0.0%
Chiselmouth	7	4.7%	31	12.3%	17	12.9%
Largescale sucker	7	4.7%	50	19.8%	29	22.0%
Mountain whitefish	3	2.0%	9	3.6%	7	5.3%
Northern pike minnow	20	13.4%	47	18.6%	22	16.7%
Smallmouth bass	65	43.6%	54	21.3%	7	5.3%
Speckled dace	0	0.0%	7	2.8%	2	1.5%
Common carp	9	6.0%	1	0.4%	0	0.0%
Longnose dace	0	0.0%	4	1.6%	1	0.8%
Redside shiner	22	14.8%	10	4.0%	38	28.8%
Redband trout	5	3.4%	10	4.0%	4	3.0%
Sculpin	2	1.3%	8	3.2%	0	0.0%
Rainbow trout	0	0.0%	0	0.0%	0	0.0%
Mountain sucker	0	0.0%	0	0.0%	0	0.0%
Total Number	149	100%	253	100%	132	100%
RFI Score[a]	35		41		45	

a River Fish Index, RFI Score <54=condition rating "below minimum threshold" RFI Score 55-69=condition rating "1" RFI Score70-75=condition rating "2" RFI Score>75=condition rating "3"

Macroinvertebrates

Macroinvertebrate samples were collected at two sites on the middle Weiser River: Weiser River above Crane Creek near Weiser, Idaho, and Weiser River above Midvale, Idaho. One set of samples was collected in August 2001 and one set was collected in 2002. The 2001 samples were analyzed with the use of the RMI developed by DEQ (Grafe et al. 2002). The results from 2001 are reported in Table 33. The results from 2002 have not been received by DEQ's Boise Regional Office.

The results from the samples collected in 2001 indicate the macroinvertebrate communities found at the two stations from Little Weiser River to Galloway Dam represent good water quality. All samples were above the threshold scoring levels and were the highest condition rating score that can be obtained by using the RMI (Grafe et al. 2002). When combined with at least one other index score, such as the RDI or the RFI, and the average condition rating score is greater than 2, the water body would be determined to be fully supporting its beneficial uses. However, as is the case of the middle Weiser River, if one of the indices is less than the threshold value, then the water body is not fully supporting the beneficial uses. For the middle Weiser River, the RFI score was below the threshold value (Grafe et al. 2002).

Table 33. River Macroinvertebrate Index Scores, Weiser River above Crane Creek near Weiser, Idaho, and above Midvale, Idaho. Weiser River, Little Weiser River to Galloway Dam.

Metric	Above Crane Creek August 2001 RMI[a] Metric Result	Above Crane Creek August 2001 RMI Metric Score	Above Midvale August 2001 RMI Metric Result	Above Midvale August 2001 RMI Metric Score
Number of Taxa	35	5	32	5
Number EPT[b] Taxa	20	5	16	3
Percent Elmidae	6.66%	5	4.94%	5
Percent Dominate Taxa	1.33%	5	14.99%	5
Percent Predators	4.66%	3	6.92%	3
Total RMI Index Score		23		21
Condition Rating		3		3

a River Macroinvertebrate Index, RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3"
b Ephemeroptera-Plecoptera-Trichoptera

Since the RFI score indicates the river is not supporting its beneficial uses, the high RMI score may seem irrelevant. However, the use of individual metrics and other indices can be useful in determining what pollutant may be impairing the uses. As pointed out by Clark (2003), the presence or absence of certain Plecoptera (stonefly) species can assist in determining if sediment is a pollutant affecting the beneficial uses. In the macroinvertebrate analysis of samples collected on the lower Weiser River, Clark (2003) noted the lack of Plecoptera species that would be classified as sediment intolerant, which indicates fine sediments are impairing the beneficial uses designated for the lower Weiser River. Most of the species analyzed by Clark indicated that fine sediment dominated the substrate in the lower Weiser River (more than 30% of the sediment was fine sediment [<6 mm]).

Water Column Data

Unlike the lower Weiser River from Galloway Dam to the Snake River, the middle segment has limited water quality data. Appendix C contains available data that will assist in determining the support status of the designated uses and the loading capacity required for the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ 2003) and for the lower Weiser River.

The USGS has conducted sporadic monitoring on the Little Weiser River, Weiser River, and some of the tributaries located within the hydraulic boundaries of this segment. Most of the sampling consisted of monitoring of one or two parameters over a short duration. EPA monitoring conducted in the year 1975 was a portion of the overall watershed monitoring conducted by Tangarone and Bogue (1976). The Tangarone and Bogue (1976) study provides little information and is mainly a snapshot of a short monitoring effort that lasted only a few days. However, it is one of the few published reports concerning this segment.

In the years 2000-2001, DEQ conducted a more intense study that addressed the pollutants on the Idaho 1998 §303(d) list (Ingham 2000). This study examined in closer detail the listed pollutants and the possible impacts associated with the listed pollutants. Some of the parameters selected in the 2000-2001 study focused on numeric criteria established in the WQS to support the designated use for this segment. The parameters used to determine compliance with the established designated uses included bacteria, temperature, and dissolved oxygen. Nutrient and sediment samples were collected to assist in meeting the load allocation established by the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). Nutrient and sediment data were also collected to determine any additional reductions that might be required after further examination of biological data and the support status of the designated uses is determined for the Weiser River from the Little Weiser River to Galloway Dam.

Each of the listed pollutants of concern will be discussed separately. Recommendations will then be made on actions to address those pollutants related to the Weiser River or to address the targets established in the *Snake River-Hells Canyon TMDL* (Idaho DEQ 2003).

Bacteria

The middle Weiser River, from the Little Weiser River to Galloway Dam, is designated for primary contact recreation (IDAPA 58.01.02.140.18.SW-1). A discussion of the application of bacteria criteria and contact recreation is located in Section 2.3.

Past water quality monitoring conducted on this segment for fecal coliform triggered additional monitoring because elevated levels were found (past studies focused on the fecal coliform indicator for the support of primary and secondary contact recreation; in 2000, Idaho changed the criteria to the use of *E. coli*). The results from USGS monitoring for fecal coliform (conducted in 1997 and 2000) are shown in Appendix C. With the change in the criteria to *E. coli* in the year 2000, it was decided that additional monitoring for *E. coli* would be required to determine if the middle Weiser River is supporting the primary contact recreation designation under the new criteria.

Data collected in the years 2000, 2001, and 2002 focused on the *E. coli* criteria. Those studies in 2001 and 2002 also focused on obtaining a geometric mean to determine compliance with IDAPA 58.01.02.251.01.c. The individual results for *E. coli* obtained in the two years of monitoring conducted by DEQ are shown in Appendix C. The results for the geometric mean data for Galloway Dam and Midvale are shown in Table 34. It is assumed that *E. coli* concentrations are not going to be different upstream and downstream of Galloway Dam. The only difference between upstream and downstream would be the overall *E. coli* load due to irrigation water withdrawal from the Weiser River.

The data indicate that the primary and secondary contact recreation geometric mean criterion is not exceeded at the two sites receiving the intensive monitoring. The data demonstrate the segment is fully supporting the primary contact recreation designated use.

Table 34. *E. coli* Geometric Mean Results, Years 2001 and 2002. Weiser River, Little Weiser River to Galloway Dam.

Station Location	Month and Year of Data	Number of Samples	*E. coli* Geometric Mean (cfu/100 ml)[a]
Weiser River at Midvale	August 2001	5	126
Weiser River at Midvale	August 2002	5	114
Weiser River at Galloway Dam	August 2001	5	88
Weiser River at Galloway Dam	August 2002	5	44

a colony forming units per 100 milliliters

Nutrients

One of the main indicators of whether nutrients are affecting water quality is dissolved oxygen. This is especially true for diel evaluations. One of the physical properties of water is that it has a higher oxygen saturation level as temperature decreases; therefore, higher dissolved oxygen levels should be noted at night than during the day. However, the dissolved oxygen levels decreased at night. This indicates that respiration or decay of aquatic plants is occurring.

The Weiser River data indicate the presence of aquatic plant growth in the middle Weiser River above Galloway Dam. However, the diel dissolved oxygen levels do not indicate that the aquatic plant growth is at a level that could be classified as a nuisance or at a level that impairs the designated uses by affecting the dissolved oxygen levels. Figure 40 shows the results of the diurnal monitoring conducted in August 2001. Figures 41, 42, and 43 show the instantaneous dissolved oxygen levels recorded by USGS in 1996-1998 and 1999-2000 and DEQ data from 2000-2001.

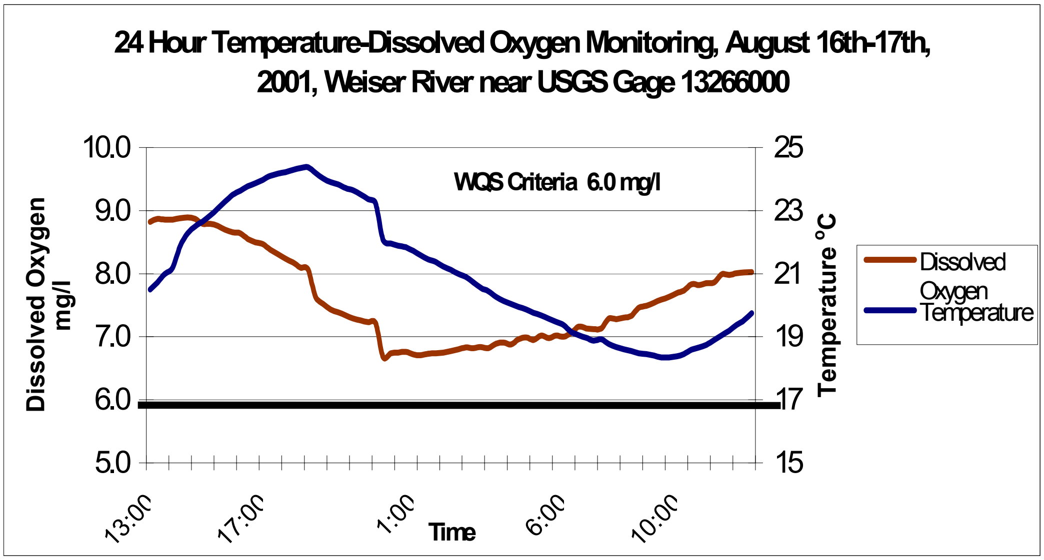


Figure 40. Twenty-Four Hour Temperature-Dissolved Oxygen Monitoring August 16-17, Weiser River near USGS Gage No. 13266000. Weiser River, Little Weiser River to Galloway Dam.

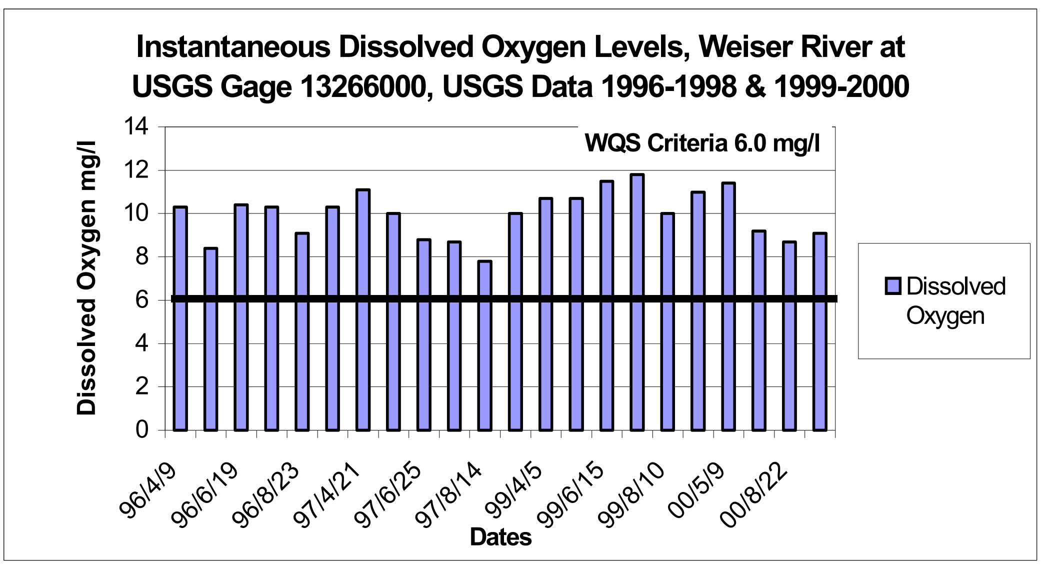


Figure 41. Instantaneous Dissolved Oxygen Levels, Weiser River near USGS Gage No. 13266000. USGS Data 1996-1998 and 1999-2000. Weiser River, Little Weiser River to Galloway Dam.

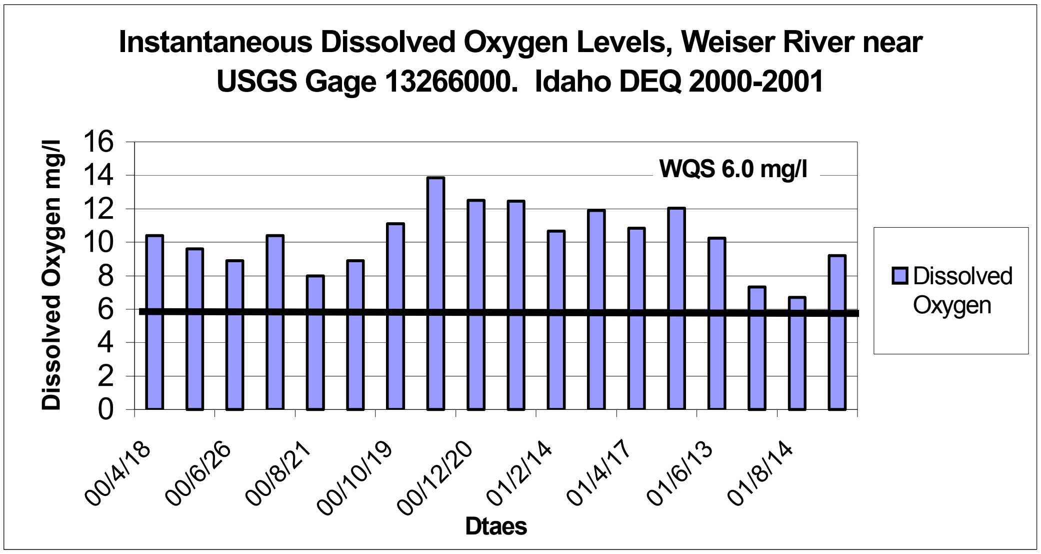


Figure 42. Instantaneous Dissolved Oxygen Levels, Weiser River near USGS Gage No. 13266000. DEQ Data 2000-2001. Weiser River, Little Weiser River to Galloway Dam.

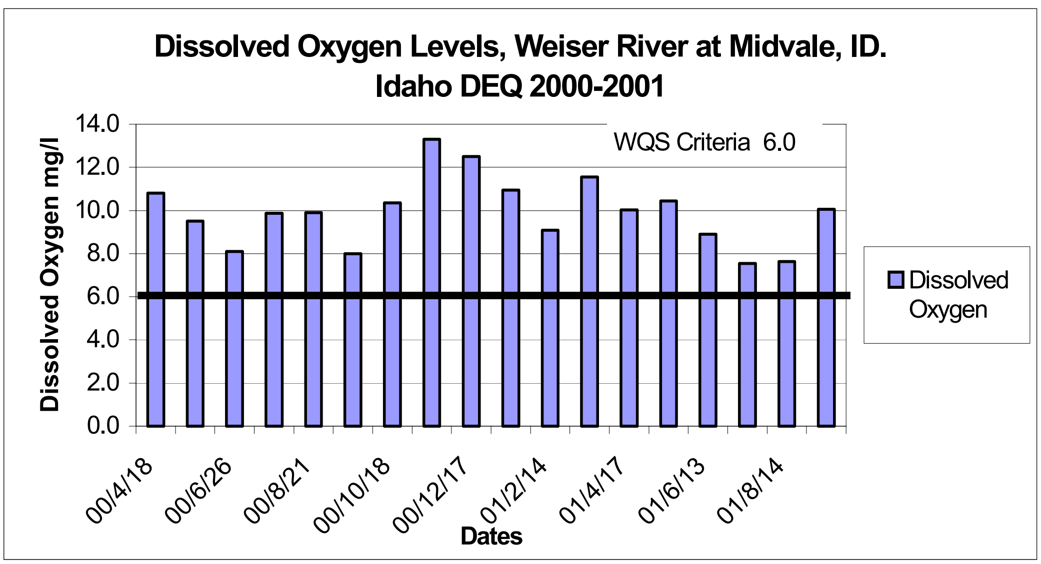


Figure 43. Instantaneous Dissolved Oxygen Levels, Weiser River at Midvale, Idaho. DEQ Data 2000-2001. Weiser River, Little Weiser River to Galloway Dam.

Although it has been determined that nutrients are not impairing the designated uses in the lower Weiser River, it has been determined that nutrients entering the Snake River from the Weiser River Watershed are impairing the Snake River's beneficial uses. The *Snake River-Hells Canyon SBA- TMDL* (Idaho DEQ and Oregon DEQ 2004) has identified phosphorus as the nutrient of concern originating from the Weiser River

Watershed and other watersheds discharging to the Snake River. The *Snake River-Hells Canyon SBA- TMDL* (Idaho DEQ and Oregon DEQ 2004) has set a total phosphorus target of 0.07 mg/L to prevent eutrophic conditions. This target has also been assigned to the major tributaries to the Snake River in southwestern Idaho and eastern Oregon (i.e., Payette River, Boise River, Malheur River, Owyhee River, and Weiser River). Current total phosphorus levels in the Weiser River exceed the total phosphorus target of 0.07 mg/L. This target will need to be met during the period from May through September. This period has been identified as the critical period to prevent nuisance aquatic growths in the Snake River and Brownlee Reservoir. A discussion of total phosphorus load allocations is found in Section 3.2.

Sediment

Sediment is a pollutant of concern listed for the middle Weiser River. Periphyton analysis indicates that sediment is impairing the designated uses within the middle Weiser River. Additionally, the loading analysis for sediment for the lower Weiser River indicates that a reduction in sediment loading from upstream must be achieved to meet the targets for the lower segment.

Data from DEQ 2000-2001 monitoring efforts (Ingham 2000) are presented in Table 35. Loading to the lower Weiser River may vary due to irrigation water withdrawals from the Sunnyside and Galloway Canals.

Table 35. Measured Total Suspended Solid Concentrations, Discharge, and Total Suspended Solid Load, DEQ 2000-2001 Weiser River at Midvale, Idaho. Weiser River, Little Weiser River to Galloway Dam.

	TSS[a] Concentration (mg/L)[b]	Discharge (cfs)[c]	TSS Load (kg/day)[d]
Average	28	693	66,997
Standard Deviation	19	843	92,919
Maximum	64	2,601	272,274
Minimum	2.0	55.0	989
Count	18	18	18

a total suspended solids
b milligrams per liter
c cubic feet per second
d kilograms per day

As with total phosphorus loads calculated for the lower Weiser River and middle Weiser River, normalized discharge should also be calculated for TSS at the USGS gage site. The normalization of the discharge will assist in establishing TSS loads and concentrations based on average daily discharges. Figure 44 shows the results of the regression analysis based on normalized discharge. Table 36 presents the normalized concentrations, discharge, and total suspended solids load.

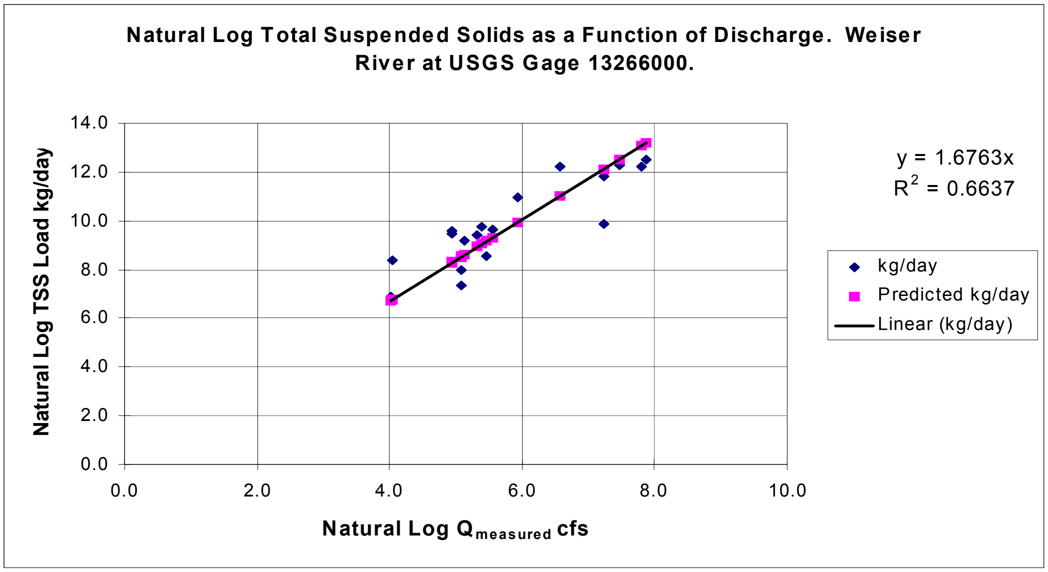


Figure 44. Regression Analysis for Total Suspended Solid Loads as a Function of Discharge. Weiser River at USGS Gage No. 13266000. DEQ 2000-2001. Weiser River, Little Weiser River to Galloway Dam.

Further statistical analysis and comparison of measured and estimated TSS concentrations and loads are presented in Appendix C. Measured TSS loads and estimated TSS loads were analyzed to determine error or bias in calculations. Overall the measured TSS load provided a lower percent difference than the estimated load.

Table 36. Measured and Estimated Total Suspended Solid Concentrations, Discharge, and Suspended Solid Load, DEQ Data 2000-2001. Weiser River at Midvale, Idaho. Weiser River, Little Weiser River to Galloway Dam.

	Measured Discharge (cfs)[a]	Measured TSS[b] Concentration (mg/L)[c]	Measured TSS Load (kg/day)[d]	Estimated Discharge (cfs)	Estimated TSS Concentration (mg/L)	Estimated TSS Load (kg/day)
Average	693	28	66,997	1,182	45	197,196
Standard Deviation	843	19	92,919	1,013	29	217,621
Max	2,601	64	272,274	2,614	84	535,093
Min	55.0	2.0	989	178.0	14	5,921
Count	18	18	18	18	18	18
					Square Root Error	1,196,632
					% Difference Measure	5.8%
					% Difference Estimated	16.5%

a cubic feet per second
b total suspended solids
c milligrams per liter
d kilograms per day

Table 37 shows the estimated monthly flows, TSS loads, and TSS concentrations for the middle Weiser River at USGS Gage No. 13266000. The overall load may change due to irrigation water withdrawals from the Sunnyside and Galloway Canals, but it is assumed that concentrations below the withdrawals will not be affected. Further analysis of tributary inflows and sediment load will assist in evaluation of sediment load from tributaries and upstream sediment sources.

The results from the sediment rating curve model provide a more detailed monthly sediment analysis and an even more detailed daily load and concentration analysis. However, the results from the modeling effort may underestimate high yield slugs of TSS associated with the rising hydrograph and/or storm events. The sediment curve rating may equally overestimate long- and short-term TSS averages. These over/under estimations will be examined in more detail in the development of a TMDL for this parameter.

Table 37. Estimated Discharge and Total Suspended Solids Concentrations and Load, Weiser River at USGS Gage No. 13266000. Weiser River, Little Weiser River to Galloway Dam.

Month	Estimated Discharge at Snake River (cfs)[a]	Estimated TSS[b] Concentration at Snake River (mg/L)[c]	Estimated TSS Load at Snake River (kg/day)[d]
Oct	186	14.0	6,413
Nov	308	19.5	15,470
Dec	615	31.3	48,753
Jan	927	41.0	99,155
Feb	1,536	57.5	235,780
Mar	2,409	79.0	470,904
Apr	2,488	80.9	492,982
May	2,547	82.2	512,739
June	1,550	58.1	234,926
July	388	22.7	23,385
Aug	227	16.0	8,928
Sep	181	13.7	6,086

a cubic feet per second
b total suspended solids
c milligrams per liter
d kilograms per day

Upstream of USGS Gage No. 13266000, DEQ conducted river monitoring at Midvale, Idaho (Ingham 2000). This station was established to obtain a sample of the water quality of the river before it enters the inaccessible canyon upstream of Crane Creek. The results of that monitoring are displayed in Table 38.

Table 38. Measured Total Suspended Solid Concentrations, Discharge, and Total Suspended Solid Load, DEQ Data 2000-2001, May through September. Weiser River at Midvale, Idaho. Weiser River, Little Weiser River to Galloway Dam.

	TSS[a] Concentration (mg/L)[b]	Discharge (cfs)[c]	TSS Load (kg/day)[d]
Average	10.1	635.4	37,500
Standard Deviation	12.0	909.1	71,900
Maximum	40.0	3,215.0	244,000
Minimum	2.0	34.0	215
Count	18	18	18

a total suspended solids
b milligrams per liter
c cubic feet per second
d kilograms per day

Total suspended solid concentrations increased by about 107%, and TSS load concentrations increased by about 380% between the Weiser River at Midvale and the USGS gage site. Total suspended solid concentration and load increases are probably associated with Crane Creek inflows.

Substrate Sediment

As discussed in Section 2.3, substrate composition will affect biological communities and structure. In August 2003, DEQ evaluated the substrate at three locations on the middle Weiser River. Table 39 shows the percentage of the substrate that is less than 6.0 mm in size.

Table 39. Percent Substrate Less Than 6 Millimeters in Size. Weiser River, Little Weiser River to Galloway Dam.

	Weiser River at Presley Bridge	Weiser River below Little Weiser River	Average for Segment
Percent of Substrate Less than 6 mm in Size	19.8%	22.5%	21.2%

Status of Beneficial Uses

Both the narrative and numeric criteria were examined for the listed pollutants of concern to determine beneficial use support status in the middle Weiser River. A biological assessment was conducted and compared to indices developed and published in the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002).

Analysis of the biological communities revealed that sediment, a pollutant of concern listed on the 1998 Idaho §303(d) list, is impairing the designated uses established for the middle Weiser River. Through both water quality monitoring and biological assessment, it was determined that *E. coli* bacteria and nutrients are not impairing designated uses on the middle Weiser River. Table 40 provides information on the final assessment and status of the designated beneficial uses.

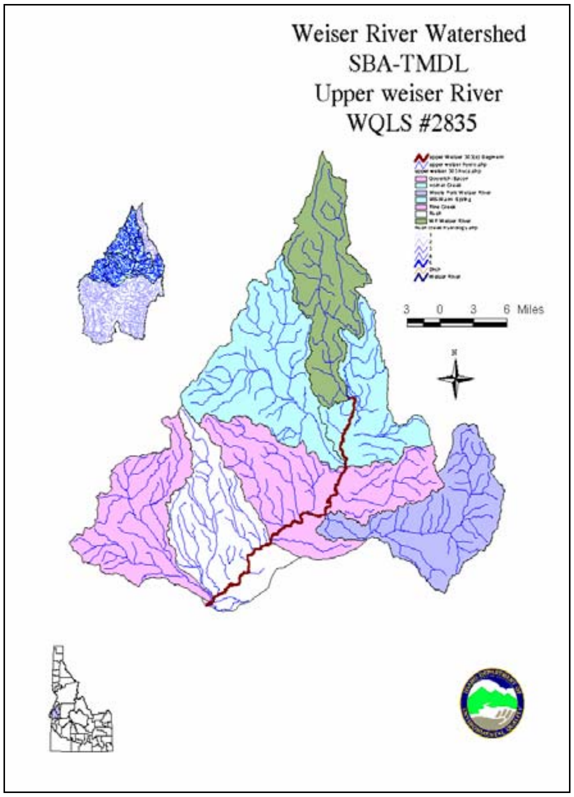
Table 40. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Middle Weiser River at Galloway Dam. Weiser River, Little Weiser River to Galloway Dam.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendations
Cold Water Aquatic Life	Not Supported	Sediment	Biological Assessment Indicated Impairment	Develop TMDLs to Address Sediment. Develop Total Phosphorus Allocations.[a]
Primary Contact Recreation	Fully Supported		Numeric Criteria Not Exceeded	No Action to be Taken
Secondary Contact Recreational	Fully Supported		Numeric Criteria Not Exceeded	No Action to be Taken
Drinking Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Special Resource Waters	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

In addition to protecting the designated uses for the middle Weiser River, nutrient targets have been established through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus in the middle Weiser River have shown that reductions must occur in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). Section 3.2 addresses total phosphorus load allocations.

Weiser River, West Fork Weiser River to Little Weiser River



Water Body	Weiser River, West Fork Weiser River to Little Weiser River
Miles of impaired water body	31.5
Listed pollutants	Sediment and Nutrients
Potential impaired designated uses	Cold water aquatic life, salmonid spawning, primary contact recreation
Potential sources	Municipal wastewater treatment plants, overland flow, irrigated induced erosion, stream bank erosion

Discharge (Flow) Characteristics

The USGS discharge gage (1325800) is located on the Weiser River approximately 2 miles upstream of Cambridge, Idaho, and about 5 miles upstream of the confluence of the Little Weiser River. There are two major tributaries between the USGS gage site and the Little Weiser River: Rush Creek and Pine Creek. In addition to other small tributaries, the Cambridge and Council wastewater treatment plants (WWTPs) discharge into this section of the Weiser River.

Figure 45 shows the normalized discharge recorded at USGS Gage No. 13258500, located near Cambridge, Idaho. A summary of the discharge data is available in Appendix C.

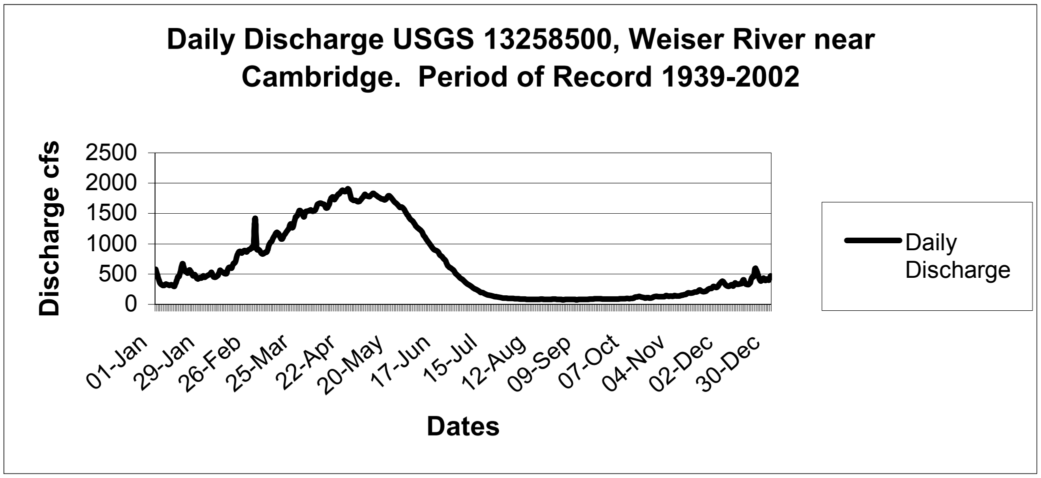


Figure 45. Normalized Average Daily Discharge at USGS Gage No. 13258500. Weiser River near Cambridge, ID. Weiser River, West Fork Weiser River to Little Weiser River.

The discharge data presented in Figure 45 are from the years 1939 to 2002. Data from other discharge measurements conducted in this portion of the watershed are described in Appendix C.

In the years 2000-2001, DEQ conducted an intensive monitoring effort in the Weiser River Watershed. One monitoring site was on the Weiser River upstream of the Council WWTP (Ingham 2000). The other site was at the USGS gage near Cambridge. However, both sites relied on either existing discharge data or data available for analysis from current USGS discharge data corresponding to the date of sampling.

Biological and Other Data

Biological information is limited to three sites on the Weiser River. These data were collected as a part of DEQ monitoring efforts in the years 2000 and 2001 (Ingham 2000) and a 1999 IDFG fisheries survey. All sites are all within the §303(d) listed segment of the upper Weiser River. Further analysis was applied to all three sets of data with an emphasis on the overall support/nonsupport status of designated uses for this segment. Appendix C contains descriptions of and information on biological data sources.

Periphyton

Periphyton samples were collected by DEQ at two sites, Goodrich and Council in August 2000 and again in July 2001.

Dr. Loren Bahls submitted detailed reports interpreting periphyton community structure and composition (Bahls 2000 and 2001). Dr. Bahls determined that the beneficial uses were fully or partially supported at the two sites receiving periphyton analysis. Both sites' pollution indices indicated good water quality and no organic loading impairing the uses.

However, at the Goodrich site, the Siltation Index was at a level of slight impairment from sediment. At the Council site, the Siltation Index did not indicate impairment. Table 41 shows the scores for the indices mentioned in Bahls (2000 and 2001).

Table 41. Periphyton Result for Specific Indices. Weiser River, West Fork Weiser River to Little Weiser River.

Site	2000 Pollution Index Score[a]	2000 Siltation Index Score[b]	2000 Percent Dominant[c]	2001 Pollution Index Score	2001 Siltation Index Score	2001 Percent Dominate
Weiser River at Goodrich WR-007	2.38	44.52	25.24	2.27	38.50	14.41
Weiser River at Council WR-008	2.50	29.33	9.29	2.82	14.44	48.74

a >2.5 No Impairment, 2.01-2.50 Minor Impairment, 2.00-1.5 Moderate Impairment, <1.5 Severe Impairment.
b <20.0 No Impairment, 20.0-39.9 Minor Impairment, 40.0-59.9 Moderate Impairment, >60.0 Severe Impairment.
c <25.0 No Impairment, 25.0-49.9 Minor Impairment, 50.0-74.9 Moderate Impairment, >74.9 Severe Impairment

The overall RDI scores indicates a condition rating of a 1 at the Goodrich site, while at Council the condition rating was 2 (Table 42). When combined with other indices (RMI, RFI, or RPI), a total condition rating of less than 2 would indicate not fully supporting designated uses for cold water aquatic life (Grafe et al. 2002).

However, to determine if a certain pollutant is impairing a designated use, the overall high percentage of very motile species would indicate sediment is affecting the expected community structure and composition. The high pollution tolerant percentage may also indicate organic loading (Bahls 2000 and 2001). Table 42 shows RDI metric scores and final RDI scores.

Table 42. River Diatom Index Scores. Weiser River, West Fork Weiser River to Little Weiser River.

Metric	Weiser River at Council Metric Score	Weiser River at Council RDI[a] Score	Weiser River at Goodrich Metric Score	Weiser River at Goodrich RDI Score
% Pollutant Intolerant	51.7%	1	51.3%	1
% Pollutant Tolerant	2.8%	1	13.2%	3
Eutrophic Taxa Richness	18	5	24	1
% Nitrogen Heterotrophs	5.3%	3	12.9%	3
% Polysaprobic	27.5%	5	15.8%	1
Alkaliphilic Taxa Richness	24	1	30	3
% Requiring High Oxygen	5.6%	3	13.0%	1
% Very Motile	15.4%	3	27.5%	1
% Deformed	0%	5	0%	5
Final River Diatom Index Score		27		19
Final Condition Category Rating		2		1

a River Diatom Index, RDI Score<22=condition rating “1” RDI Score 22-33=condition rating “2” RDI Score >34=condition rating “3”

Fisheries

Most fish species identified during the IDFG survey are non-game species. However, numerous cold water species, such as mountain whitefish and wild rainbow trout, were present at the Cambridge site. Both species are classified as cold water aquatic life species and are desirable catchable species. Smallmouth bass were also collected at this site, indicating the existence of a cool water game fishery. Table 43 provides information about the fish found during the IDFG survey.

Fish data collected in 1999 were entered into DEQ’s RFI database. The Cambridge site had a score of 58. According to the *Water Body Assessment Guidance* (Grafe et al. 2002), this score would place the upper Weiser River into a condition rating of 2. When combined with a least one other index score (such as scores from the RMI, the RDI, or the RPI) and the mean score of at least two of the indices is less than 2, the system is classified as not fully supporting the cold water aquatic life use. Or, if one of the category values is below the threshold value the water body would be determined to be not fully supporting beneficial uses (Grafe et al. 2002).

Table 43. Presence/Absence of Fish Species. Weiser River, West Fork Weiser River to Little Weiser River.

Weiser River at Cambridge June 1999		
Species Found	**Count**	**Percent of Total**
Bridgelip sucker	15	3.5%
Channel catfish	0	0.0%
Chiselmouth mouth	31	7.3%
Largescale Sucker	114	26.9%
Mountain whitefish	74	17.5%
Northern pike minnow	51	12.0%
Smallmouth bass	4	0.9%
Speckled dace	0	0.0%
Common carp	0	0.0%
Longnose dace	0	0.0%
Redside shiner	93	21.9%
Redband trout	40	9.4%
Sculpin	0	0.0%
Rainbow trout	1	0.2%
Mountain succor	1	0.2%
Total Number	424	100%

Macroinvertebrates

Macroinvertebrate samples were collected during the same period that periphyton samples were collected. Unfortunately, the macroinvertebrate sample results for 2001 have not been received by DEQ's Boise Regional Office. As these results are received, amendment to either the draft or final document will be made. The River Macroinvertebrate Index results from the year 2000 are shown in Table 44.

Table 44. River Macroinvertebrate Index Scores. Weiser River, West Fork Weiser River to Little Weiser River.

Metric	Weiser River at Council Metric Result	Weiser River at Council RMI[a] Metric Score	Weiser River at Goodrich Metric Result	Weiser River at Goodrich RMI Metric Score
Number of Taxa	42	5	27	5
Number EPT[b] Taxa	32	5	17	5
Percent Elmidae	3.08%	5	8.22%	5
Percent Dominate Taxa	19.08%	5	1.76%	5
Percent Predators	4.62%	3	1.96%	1
Total RMI Index Score		23		21
Condition Rating		3		3

a River Macroinvertebrate Index, RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3" b Ephemeroptera-Plecoptera-Trichoptera

When combined with the RFI and RDI, the use of the RMI condition rating gives an overall condition rating of 2. This overall condition rating greater than or equal to 2 indicates the upper Weiser River, West Fork to Little Weiser River, is fully supporting beneficial uses.

Water Column Data

The USGS has performed extensive water quality evaluations in the upper Weiser River. Most of the monitoring was conducted at USGS Gage No. 13258500 approximately 2 miles upstream of Cambridge, Idaho. Most of the nutrient and sediment data go back to the late 1970s and early 1980s. DEQ conducted water quality monitoring at the same location in the years 2000-2001. Appendix C contains data that will assist in determining the support status of the designated uses and/or the loading capacity required for the lower and middle Weiser River and for the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

As required by the National Pollution Discharge Elimination System (NPDES), all point sources discharging to waters of the United States must obtain a permit from EPA or a state agency. In Idaho, EPA has primacy over point source discharges and administers the NPDES program.

Each of the listed pollutants of concern will be discussed separately. Recommendations will then be made to address those pollutants related to lower, middle and upper Weiser River and to address the targets established in the *Snake River-Hells Canyon TMDL* (Idaho DEQ and Oregon DEQ 2004).

Bacteria

The Weiser River is designated for primary contact recreation (IDAPA 58.01.02.140.18.SW-7). A discussion of contact recreation definitions and criteria is presented in Section 2.3.

Bacteria is not listed as a pollutant of concern in the upper Weiser River (Idaho DEQ 1998*a*). During intensive water quality monitoring conducted by DEQ during the years 2000-2001 (Ingham 2000), two *E. coli* samples exceeded the single sample criteria. These single sample exceedances triggered additional monitoring to determine compliance with the geometric mean criterion for *E. coli* bacteria and the WQS. Additional monitoring was conducted in June and July 2003 to obtain the five-day geometric mean. The results are presented in Appendix C. Table 45 shows the geometric mean for the Weiser River near Cambridge. The data indicate that primary contact recreation is fully supported.

Table 45. *E. coli* Geometric Mean Results for 2003. Weiser River, West Fork Weiser River to Little Weiser River.

Station Location	Month and Year of Data	Number of Samples	E. coli Geometric Mean (cfu/100 ml)[a]
USGS Gage near Cambridge, Idaho	June 26 through July21, 2003	5	38

a Colony forming units per 100 milliliters

Nutrients

Unlike the constituents discussed above, a numeric criterion for nutrients does not exist to determine if WQS are exceeded. A discussion of the nutrient criteria and beneficial use support can be found in Section 2.4.

Instantaneous dissolved oxygen levels taken by DEQ in the years 2000-2001 showed no exceedances of the Idaho WQS for water column dissolved oxygen levels. Twenty-four-hour monitoring was not conducted. Figure 46 shows the results of the instantaneous dissolved oxygen monitoring effort.

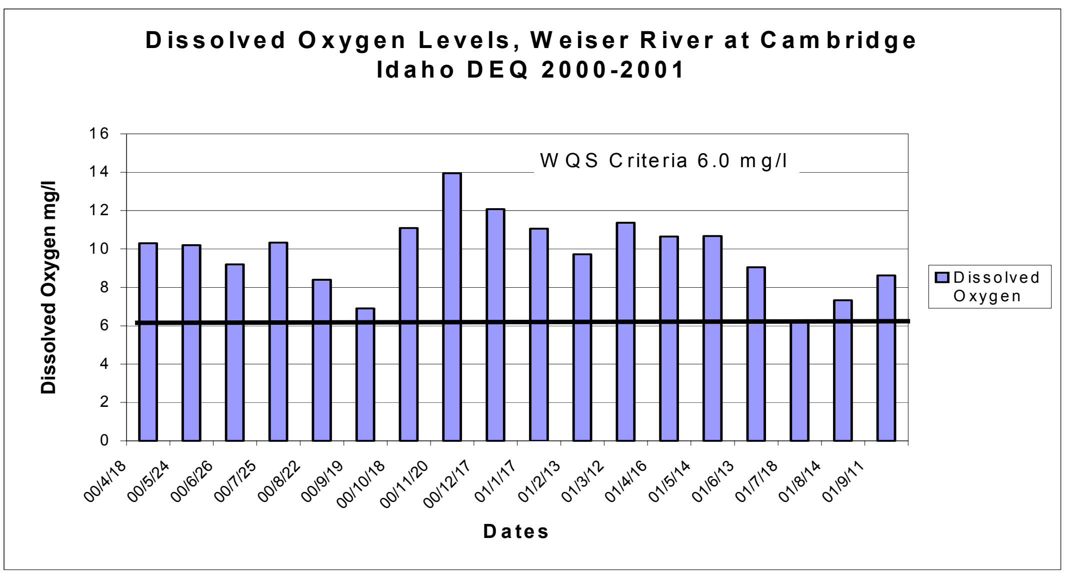


Figure 46. Instantaneous Dissolved Oxygen Levels, Upper Weiser River near Cambridge. DEQ Data 2000-2001. West Fork Weiser River to Little Weiser River.

Overall, the dissolved oxygen data indicate neither an exceedence of the WQS nor an indication that a nuisance aquatic growth exists in the upper Weiser River. Periphyton data did not show organic loading that may indicate that nutrients are impairing the designated uses in the upper Weiser River.

Sediment

Sediment is a pollutant of concern listed for the upper Weiser River. Periphyton analysis indicates that sediment is causing a slight impairment to the designated uses within the river. The overall percentage of high motile periphyton species (15.4% at Council and 25.4% at Goodrich) indicates sediment is an issue. However, in an independent evaluation, Bahls (2000-2001) stated that this score only indicates slight impairment and no other indications of sediment impairment were noted in the results.

Substrate Sediment

As discussed in Section 2.3, substrate composition will affect biological communities and structure. In August 2003, DEQ evaluated the substrate at three locations on the upper Weiser River. Table 46 shows the percentage of the substrate that is less than 6.0 mm in size.

Table 46. Percent Substrate Less Than 6 Millimeters in Size. Weiser River, West Fork Weiser River to Little Weiser River.

	Weiser River at Cambridge
Percent of Substrate Less than 6 mm in Size	16.9%

Status of Beneficial Uses

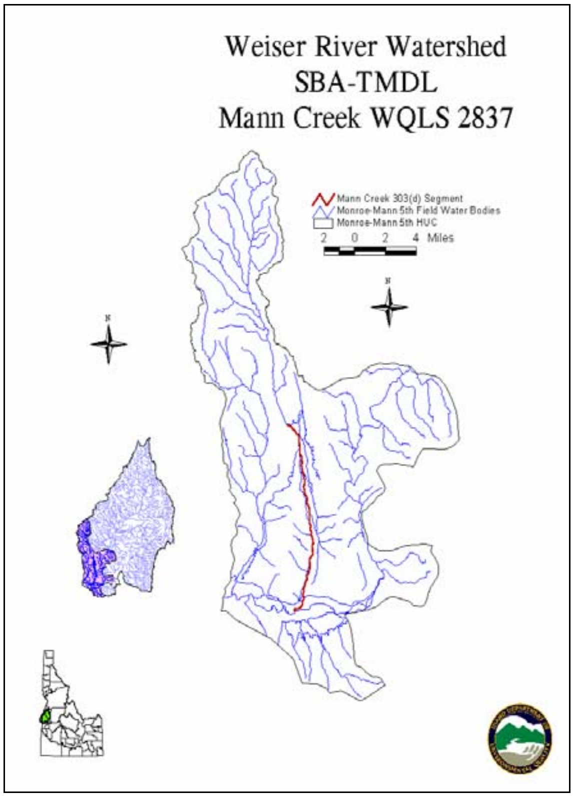
Both the narrative and numeric criteria were examined for the listed pollutants of concern to determine beneficial use support status in the Weiser River. A biological assessment was conducted and compared to indices developed and published in the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). Further analysis of the biological communities revealed that sediment, a pollutant of concern listed on the 1998 Idaho §303(d) list, may be impairing the designated uses established for upper Weiser River. There is no indication that nutrients are impairing the designated uses of the upper Weiser River. Through water quality monitoring and biological assessment, it was also determined that *E. coli* bacteria are impairing designated uses. Table 47 provides information on the final assessment and status of the designated beneficial uses.

Table 47. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Weiser River, West Fork Weiser River to Little Weiser River.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Fully Supported		Biological Assessment Indicated Full Support	No Action to be Taken for Sediment or Nutrients
Salmonid Spawning	Fully Supported		Biological Assessment Indicated Full Support	No Action to be Taken for Sediment or Nutrients
Primary Contact Recreation	Fully Supported		Numeric Criteria Not Exceeded	No Action to be Taken
Secondary Contact Recreational	Fully Supported		Numeric Criteria Not Exceeded	No Action to be Taken
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

Nutrient targets have been established through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus in the lower Weiser River have shown that a reduction must occur in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These reductions will also be allocated to address nutrient loading from tributaries and upstream sources. Further discussion on allocations for this segment is found in Section 3.3.

Mann Creek, Mann Creek Reservoir to Weiser River



Water Body	Mann Creek, Mann Creek Reservoir to Weiser River
Miles of impaired water body	13.0
Listed pollutants	Sediment
Potential impaired designated uses	Cold water aquatic life and salmonid spawning
Potential sources	Overland flow, irrigation induced erosion, rangeland

Discharge (Flow) Characteristics

Mann Creek is one of the few water bodies in the Weiser River Watershed that could be classified as regulated. The Mann Creek Reservoir is located approximately 13 miles upstream of the creek's confluence with the lower Weiser River, which makes up the entire §303(d) listed segment. Mann Creek Reservoir stores much of the late winter/early spring snowmelt for later releases during the irrigation season. Numerous diversions are located throughout the lower watershed, with diversions actually beginning at the dam itself. Other diversions are instream and are either permanent structures or temporally (year-to-year) constructed for water diversion from the stream.

Figure 47 shows the pre-dam average daily discharge recorded at USGS Gage No. 13267000 near the confluence with the Weiser River and discharge from the reservoir at USGS Gage No. 13267500. Figure 48 shows a detailed view of Mann Creek and the diversions.

As with many water bodies in the Weiser River Watershed, discharge is dependent on higher/mid elevation snow accumulation and climatic events. It is expected that ground water and irrigation return water play a large role in the final discharge into the Weiser River during irrigation season. It should be noted that some irrigation water released from Mann Creek Reservoir is actually diverted to the Monroe Creek Watershed to the south.

There have been three intensive studies that monitored flows in the Mann Creek Watershed: Tangarone and Bogue (1975), Clark (1985), and Idaho Department of Agriculture (2003). The USGS has two historic discharge recording sites in the watershed. The two gage stations provide some historic discharge information. Appendix C contains data source descriptions for Mann Creek recorded discharge.

Table 48 shows the results from the monitoring that has been conducted during past and on-going studies on Mann Creek at the confluence with the Weiser River. The data presented in Table 48 show highly variable discharges for the different years that discharge measurements were taken. To offset some of the variability, the table also shows the data with the outliers replaced with mean discharge data recorded for that month.

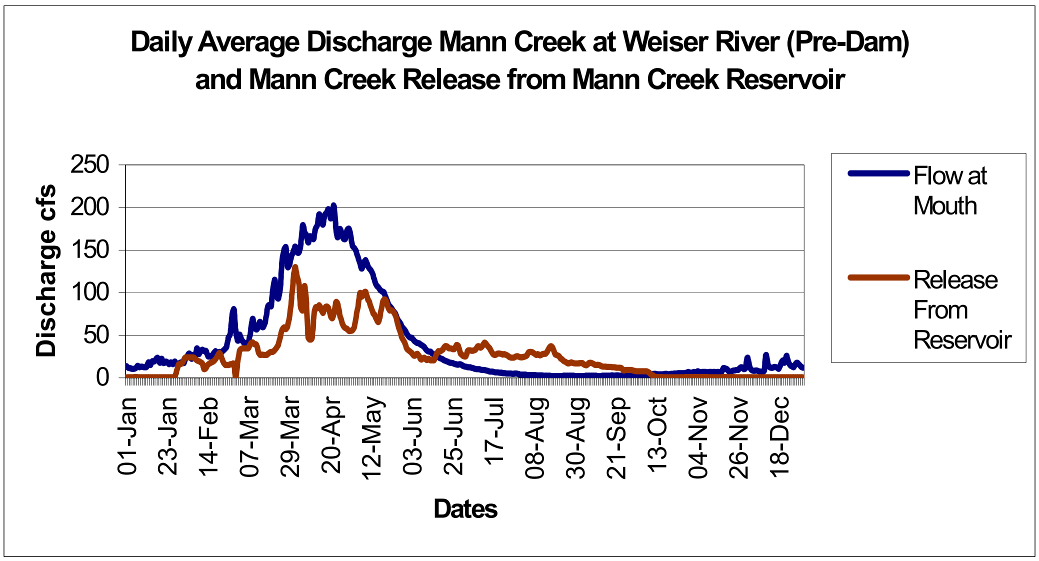


Figure 47. Average Daily Discharge From Mann Creek (Pre Dam Construction), USGS Gage No. 13267000 (Period of Record 1911-1913, 1920, 1937-1961) and Mann Creek Release from Mann Creek Reservoir, USGS Gage No. 13267050 (Period of Record 1967-1971).

Table 48. Monthly Average Measured Discharge for 1975, 1983-1984, and 2001-2003, Outliers Remaining and Outliers Smoothed for Mann Creek at the Mouth.

	DEQ 1983-1984 Discharge (cfs)[a]	IDA[b] 2001-2003 Discharge (cfs)	Combined Outliers Remain Discharge (cfs)	Combined Outliers Smoothed[c] Discharge (cfs)
Jan	no data	6.5	6.5	6.5
Feb	no data	7.4	7.4	7.4
Mar	361.5	17.8	246.9	143.9
Apr	370.0	45.3	110.2	58.3
May	339.0	27.2	131.2	61.9
June	39.0	10.5	18.6	18.6
July	13.3	12.6	12.8	12.8
Aug	24.0	6.6	13.1	13.1
Sep	24.0	5.5	9.2	9.2
Oct	10.0	9.6	9.7	9.7
Nov	no data	5.8	5.8	5.8
Dec	41.0	6.3	17.9	17.9

a Cubic feet per second
b Idaho Department of Agriculture
c High discharge measured in 1983 was subsitituted with average discharge measurements for the month.

As shown in Table 48, discharge rates in Mann Creek are highly variable from year to year. Without current discharge data over a period of time, the development of normalized rates is difficult. Any loading analysis should use the smoothed monthly averages established in Table 48 and use caution in extrapolating a reliable load analysis.

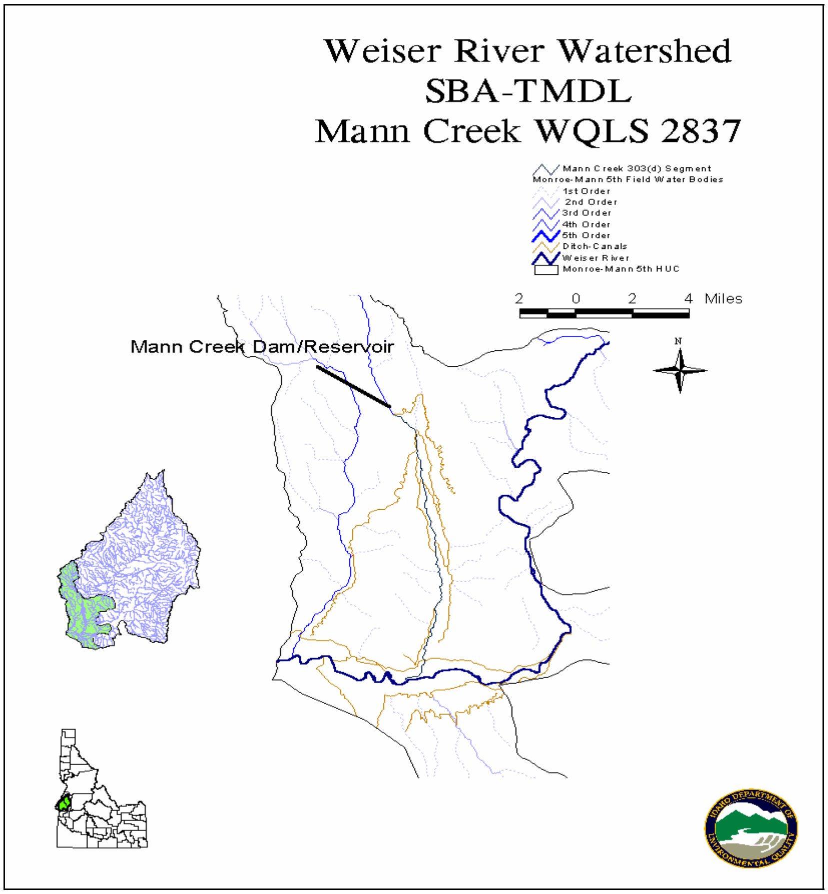


Figure 48. Mann Creek Diversions.

Biological and Other Data

DEQ BURP monitoring was performed on two sites on the §303(d) listed segment downstream of Mann Creek Reservoir. A site approximately 8 miles upstream of the confluence with the Weiser River was monitored in 1998 and again in 2002. The other site, located at the Galloway Canal crossing approximately 1 mile upstream of the confluence, was monitored in 1998. The 2002 BURP data are not available for analysis. Appendix C contains data source descriptions. Table 49 presents the results of the BURP monitoring and the related index scores that will assist in determining the support status of the designated uses (Grafe et al. 2002).

Table 49. Beneficial Use Reconnaissance Program Results. Mann Creek

BURP[a] ID No.	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	Final Condition Score
1998SBOIB027	58.64	3	79	3	3
1998SBOIB028	63.59	3	60	3	3
2002SBOIA027	70.9	3	60	3	3
2002SBOIA028	76.2	3	76.2	3	3
2002SBOIA029	66.9	3	63	3	3

a Beneficial Use Recommaissance Program
b Stream Macroinvertebrate Index
c Stream Habitat Index

In accordance with the *Water Body Assessment Guidance* (Grafe et al. 2002), when an average of two index condition rating scores is equal to or exceeds 2, the water body is considered fully supporting its beneficial uses. Both the SMI and SHI scores for Mann Creek are 3, indicating full support.

Although no impairment of the designated beneficial uses in Mann Creek is apparent, further analysis of nutrient and sediment data is warranted since load allocations for both parameters may be set for the Weiser River and the Snake River. The assessment of total phosphorus and sediment loads is discussed in Section 3.2.

Status of Beneficial Uses

There is no indication from available data that the designated uses in Mann Creek are impaired by sediment. Table 50 shows the status of beneficial uses and recommended actions.

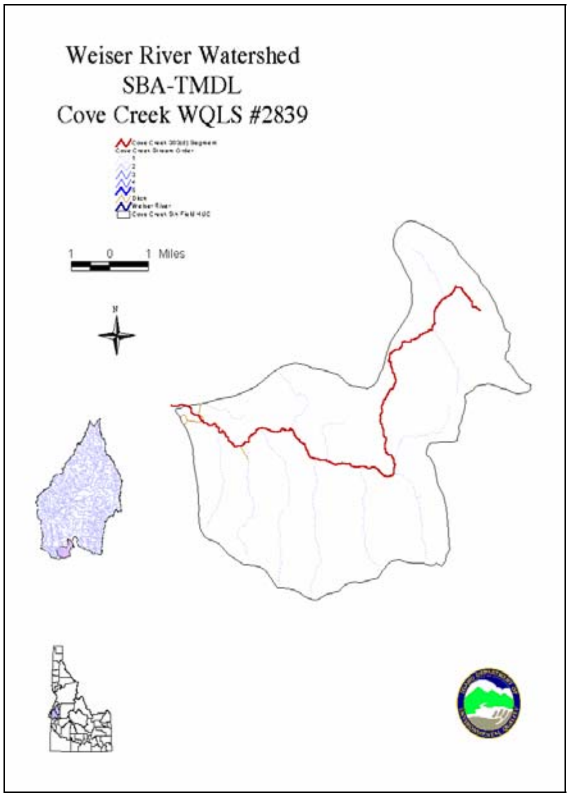
Table 50. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Mann Creek, Mann Creek Reservoir to Weiser River.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendations
Cold Water Aquatic Life	Fully Supported		As per *Water Body Assessment Guidance* (Grafe et al. 2002)	Remove from §303(d) list. Develop Total Phosphorus Allocations.[a]
Salmonid Spawning	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Primary Contact Recreation	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Secondary Contact Recreational	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Drinking Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

Although determined to be fully supporting it beneficial uses, nutrient and sediment reductions must occur to achieve targets established in the lower Weiser River or through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus and TSS in the lower Weiser River have shown that reductions must occur in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) and TSS targets determined for the Weiser River. Load analyses for both TSS and total phosphorus have been completed and are discussed in Section 3.2.

Cove Creek, Headwaters to Weiser River



Water Body	Cove Creek Headwaters to Weiser River
Miles of impaired water body	14.0
Listed pollutants	Sediment and Nutrients
Potential impaired designated uses	No designated uses for water body
Potential Sources	Overland flow, irrigation induced erosion, rangeland

Discharge (Flow) Characteristics

As with many water bodies in the Weiser River Watershed, Cove Creek discharge is dependent on mid-elevation snow accumulation and climatic events. The headwaters of Cove Creek originate in the low–elevation, sagebrush-covered hills in the southern portion of the watershed. Some irrigated lands can be found in the area near the confluence with the Weiser River and below the Sunnyside Canal. Dryland agriculture use can also be found in the area (see Figure 21).

Clark (1985) and Idaho Department of Agriculture (2003) monitored discharge in the Cove Creek Watershed. The study completed in 1984 for Cove Creek is very limited in data, with only two monitoring dates and only one with discharge data. There are no USGS discharge recording sites in the watershed. Since the 1984 study had such limited data, the most recent study by Idaho Department of Agriculture will be used. Figure 49 shows the discharge data collected during the years 2001-2002.

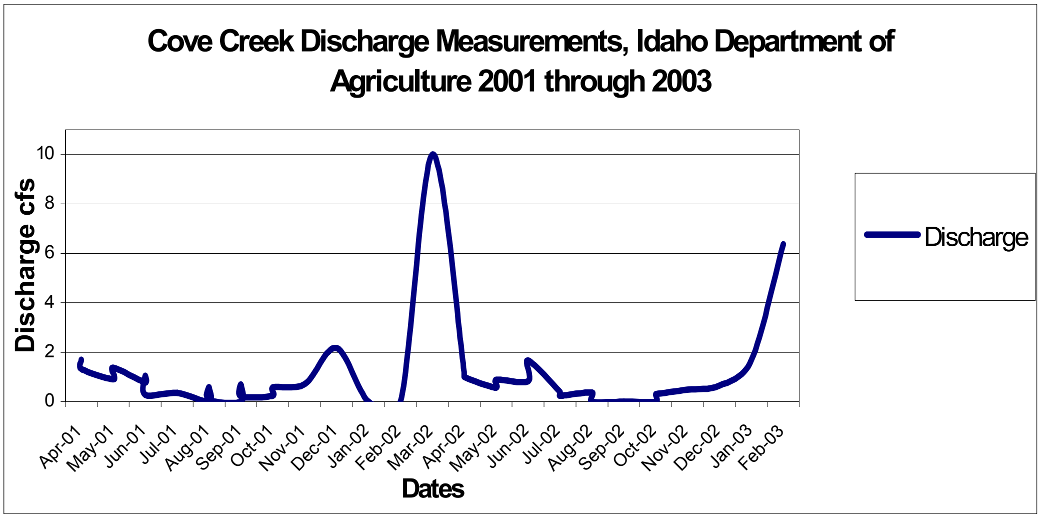


Figure 49. Discharge Measurements for Cove Creek, 2001-2003.

Cove Creek is best described as intermittent and/or ephemeral. With the available discharge data indicating zero flow, IDAPA 58.01.02.03.58 applies. A discussion of the applicable WQS for intermittent water bodies is located in Section 2.3.

The peak discharges are short in duration and are dependent on snowmelt and storm events. These periods are not optimal for the support of cold water aquatic life and will not provide adequate habitat for long-term biological communities. Recreational use is not usually associated with short duration peak discharges.

Biological and Other Data

DEQ BURP monitoring was performed on two sites in 1998. Table 51 shows the results of the BURP monitoring and the related index scores that will assist in determining the support status of the designated uses (Grafe et al. 2002).

Table 51. Beneficial Use Reconnaissance Program Results. Cove Creek

BURP[a] ID No.	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	Final Condition Score
1998SBOIB022	Dry	NA[d]	Dry	NA	NA
1998SBOIB023	20.39	Below Threshold	34	1	Not Fully Supporting

a Beneficial Use Reconnaissance Program
b Stream Macroinvertebrate Index
c Stream Habitat Index
d Not Applicable

In accordance with the *Water Body Assessment Guidance* (Grafe et al. 2002), when an average of two index condition rating scores is equal to or exceeds 2, the water body is considered fully supporting its beneficial uses. Or, if one of the index scores is below the threshold value, the water body is not fully supporting cold water aquatic life.

Although impairment to beneficial uses in Cove Creek due to its intermittent nature is not apparent, further analysis of nutrient and sediment data is warranted since load allocations for both parameters may be set for the Weiser River and the Snake River.

Status of Beneficial Uses

Cove Creek is an intermittent water body. As such, the WQS for intermittent water bodies will be applied. Table 52 provides information on the final assessment and status of the designated beneficial uses.

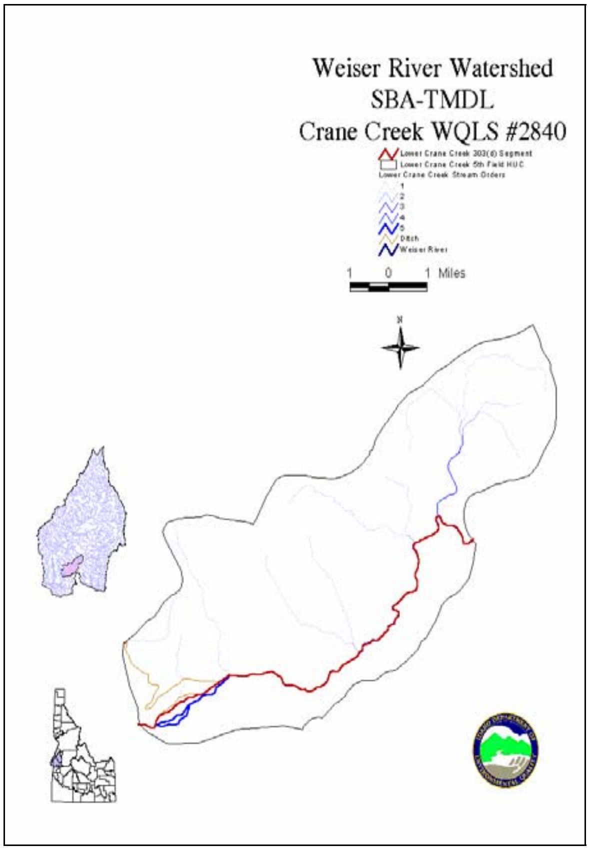
Table 52. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Cove Creek, Headwaters to Weiser River.

Existing Uses	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS[a]	Develop Total Phosphorus Allocations
Primary Contact Recreation	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS	No Action to be Taken
Secondary Contact Recreational	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS	No Action to be Taken
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a water quality standards

Although Cove Creek has been determined to be fully supporting it beneficial uses, nutrient and sediment reductions will be required to achieve targets established in the lower Weiser River or through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus and TSS in the lower Weiser River have shown that reductions must occur in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) and TSS targets determined for the Weiser River. For Cove Creek, load analyses have been completed for both TSS and total phosphorus. These analyses are located in Section 3.2.

Crane Creek, Crane Creek Reservoir to Weiser River



Water Body	Crane Creek, Crane Creek Reservoir to Weiser River
Miles of impaired water body	12.6
Listed pollutants	Sediment, Bacteria, and Nutrients
Potential impaired designated uses	Cold water aquatic life and primary contact recreation
Potential Sources	Overland flow, irrigation induced erosion, rangeland, stream bank erosion, Crane Creek Reservoir

Discharge (Flow) Characteristics

A USGS discharge gage (13265500) is located near the mouth of Crane Creek at the confluence with the Weiser River. The USGS gage is located approximately 12 miles downstream from Crane Creek Reservoir. Crane Creek discharges are regulated due to irrigation water demand downstream in the Weiser Cove area near Weiser, Idaho. Irrigation water is released from the reservoir, with a majority of the release to the Weiser River occurring from early July through September. The discharge from Crane Creek Reservoir augments Weiser River flows used for irrigation water rights. The water is diverted from the Weiser River into the two canals, Galloway and Sunnyside.

Figure 50 shows the normalized discharge recorded at USGS Gage No. 13265500, located near the mouth of Crane Creek. Data sources and descriptions of Crane Creek discharge are presented in Appendix C.

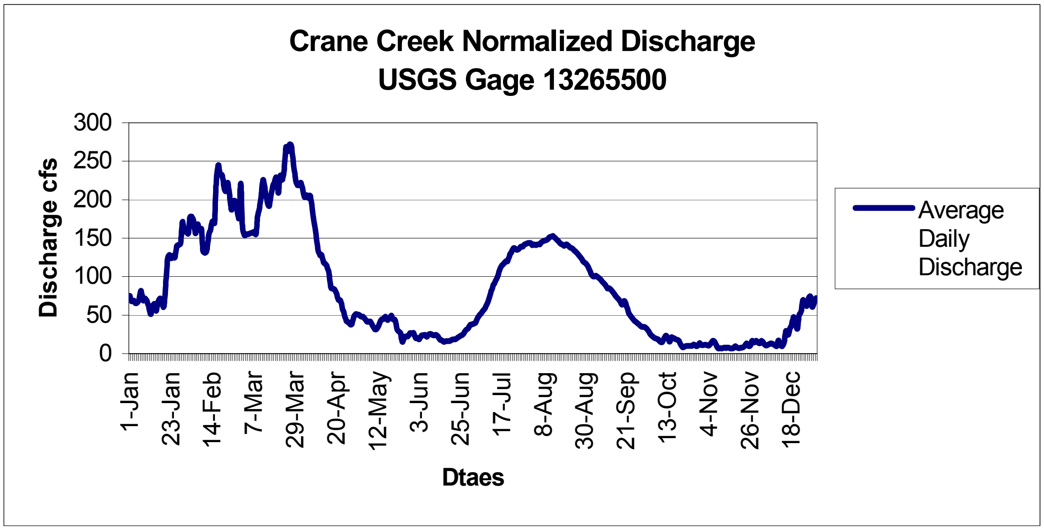


Figure 50. Normalized Average Daily Discharge at USGS Gage No. 13265500. Crane Creek, Crane Creek Reservoir to Weiser River.

Biological and Other Data

Biological data are available for only one site on the lower Crane Creek segment from the reservoir to the mouth. Some BURP monitoring was conducted in the Crane Creek area in 1996. Unfortunately, one site was dry. During the period the BURP crew visited that site (mid-August), the discharge averages were approximately 175 cfs. The other site on lower Crane Creek is directly below Crane Creek Reservoir (1996BOIB022). This site was visited in June 1996. Appendix C contains specific information about the two BURP sites.

Periphyton

Periphyton samples were collected at the one site that had adequate water in 1996. This site is directly below the Crane Creek Reservoir release. Samples results were entered into the RDI and applicable metrics are discussed below.

The RDI scores in Table 53 show high percentages of pollution tolerant and very motile species. The overall pollution tolerance rating was 2.45. The overall RDI score indicates a rating of 2. When combined with other indices (RMI, RFI, or RPI) an average rating of less than 2 would indicate not fully supporting beneficial use for cold water aquatic life (Grafe et al. 2002).

The overall high percentage of very motile species would also indicate sediment affects the community structure and composition. The high percentage of pollution tolerant species may also indicate organic loading (Bahls 2000 and 2001).

Table 53. River Diatom Index Scores. Crane Creek, Crane Creek Reservoir to Weiser River.

Metric	Crane Creek below Crane Creek Reservoir RDI[a] Metric Score	Crane Creek below Crane Creek Reservoir RDI Score
% Pollutant Intolerant	4.9%	1
% Pollutant Tolerant	71.5%	1
Eutrophic Taxa Richness	13	2
% Nitrogen Heterotrophs	15.9%	3
% Polysaprobic	7.2%	3
Alkaliphilic Taxa Richness	24	3
% Requiring High Oxygen	67.6%	5
% Very Motile	15.7%	3
% Deformed	0.0%	5
Final River Diatom Index (RDI) Score		26
Final Condition Category Rating		2

a River Diatom Index, RDI Score<22=condition rating "1" RDI Score 22-33=condition rating "2" RDI Score >34=condition rating "3"

Fisheries

No fishery information is available for Crane Creek below Crane Creek Reservoir.

Macroinvertebrates

Macroinvertebrate data were evaluated using DEQ's Stream Macroinvertebrate Index (SMI) and RMI to obtain index scores and determine support status. Both the SMI and the RMI results were below the threshold values, indicating the non-support of cold water aquatic life. Since Crane Creek is classified as a fifth order water body, the RMI is an appropriate index to apply to this water body. Table 54 shows the RMI metrics, metric scores, and final index score.

Table 54. River Macroinvertebrate Index Scores. Crane Creek, Crane Creek Reservoir to Weiser River.

Metric	Crane Creek below Crane Creek Reservoir RMI[a] Metric Score	Crane Creek below Crane Creek Reservoir RMI Score
Number of Taxa	12	1
Number EPT[b] Taxa	6	1
Percent Elmidae	0%	1
Percent Dominate Taxa	47.57%	3
Percent Predators	0%	1
Total RMI Index Score		7
Condition Rating		Below minimum threshold

a River Macroinvertebrate Index, RMI Score <11="below minimal threshold" RMI Score 11-13=condition rating "1", RMI Score 14-16=condition rating "2", RMI Score >16=condition rating "3"
b Ephemeroptera-Plecoptera-Trichoptera

Additional analysis of the presence or absence of certain indicator species would assist in determining if a pollutant of concern is impairing the designated uses for Crane Creek. The complete absence of Plecoptera order strongly indicates that sediment is a pollutant impairing the cold water aquatic life designated use. Numerous species in the Plecoptera order are intolerant of sediment and usually are a good indicator of cold water aquatic life support status (Hafele and Hinton 1996).

Water Column Data

Appendix C contains information on data that will be used in this assessment. The available data will assist in determining the support status of the designated uses and the loading capacity required for the lower Weiser River and the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

The USGS conducted intensive suspended sediment monitoring on Crane Creek for several years in the 1970s and 1980s. Discharge was the only other parameter that received intensive monitoring. DEQ conducted one year of intensive monitoring from 1983 to 1984 and examined numerous parameters. EPA monitoring conducted in the year 1975 was a portion of an overall watershed monitoring effort conducted by Tangarone and Bogue (1976). The Tangarone and Bogue (1976) study provides limited information with few data points. However, it is one of the few published reports concerning this segment.

Crane Creek was not included in the 2000-2001 Weiser River monitoring effort conducted by DEQ. However, in July 2003, DEQ initiated an intensive *E. coli* monitoring effort to gather additional information and to determine support status for primary contact recreation.

Each of the listed pollutants of concern will be discussed separately. Recommendations will then be made on actions to address those pollutants related to Crane Creek and the Weiser River and to address the targets established in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

Bacteria

Crane Creek is designated for primary contact recreation (IDAPA 58.01.02.140.18.SW-3). A discussion of the criteria for contact recreation is found in Section 2.3.

The results of water quality monitoring for fecal coliform conducted on this segment triggered additional monitoring (Note: past studies focused on the fecal coliform indicator for the support of primary and secondary contact recreation; in the year 2000, Idaho changed the criteria to the use of *E. coli*). With the change in the criteria to *E. coli* in the year 2000, it was decided that additional monitoring for *E. coli* would be required to determine if Crane Creek is supporting the primary contact recreation designation under the new criteria.

The Idaho Department of Agriculture collected *E. coli* data between the years 2000 and 2003. These results are presented in Appendix C, as are results from DEQ monitoring of fecal coliform conducted in the years 1983 and 1984. The results from the Idaho Department of Agriculture do show numerous exceedances of the single sample WQS criterion for *E. coli*. These single sample exceedances are not in themselves a violation of WQS, but they do trigger a requirement for additional monitoring to determine a 30-day geometric mean.

Data collected in the year 2003 focused on the *E. coli* criteria and on obtaining a geometric mean to determine compliance with IDAPA 58.01.02.251.01.c. The geometric mean results from the year 2003 are shown in Table 55. Table 56 shows the results from duplicate samples taken at the same time.

The data indicate that the primary and secondary contact recreation geometric mean criterion is exceeded near the confluence with the Weiser River. The data demonstrate the segment is not supporting the primary contact recreation designated use.

Table 55. *E. coli* Individual and Geometric Mean Results, June-July 2003. Crane Creek, Crane Creek Reservoir to Weiser River.

Station Location	Date of Monitoring	Flow (cfs)[a]	E. coli (cfu/100 ml)[b]
Crane Creek near USGS Gage 13265500	06/30/2003	72.8	1,700
Crane Creek near USGS Gage 13265500	07/08/2003	105	520
Crane Creek near USGS Gage 13265500	07/21/2003	164	390
Crane Creek near USGS Gage 13265500	07/22/2003	229	300
Crane Creek near USGS Gage 13265500	07/28/2003	221	260
		Geometric Mean	411

a cubic feet per second
b colony forming units per 100 milliliters

Table 56. Duplicate *E. coli* Individual and Geometric Mean Results, June-July 2003. Crane Creek, Crane Creek Reservoir to Weiser River.

Station Location	Date of Monitoring	Flow (cfs)[a]	E. coli (cfu/100 ml)[b]
Crane Creek near USGS Gage 13265500	06/30/2003	72.8	2,100
Crane Creek near USGS Gage 13265500	07/08/2003	105	500
Crane Creek near USGS Gage 13265500	07/15/2003	164	340
Crane Creek near USGS Gage 13265500	07/21/2003	229	220
Crane Creek near USGS Gage 13265500	07/28/2003	221	280
		Geometric Mean	466

a cubic feet per second
b colony forming units per 100 milliliters

Nutrients

Unlike the constituents discussed above, there are no numeric WQS for nutrients. A further discussion of WQS criteria and beneficial use support is located in Section 2.4.

Instantaneous dissolved oxygen levels measured by DEQ in the years 1983 and 1984 showed no violations of the Idaho WQS for water column dissolved oxygen (See Figure 51). Twenty-four-hour monitoring was not conducted. Periphyton results may indicate an organic load based on the pollution tolerance metrics. Dissolved oxygen data collected by the Idaho Department of Agriculture in the year 2000 and did not indicate violations of WQS (Figure 52).

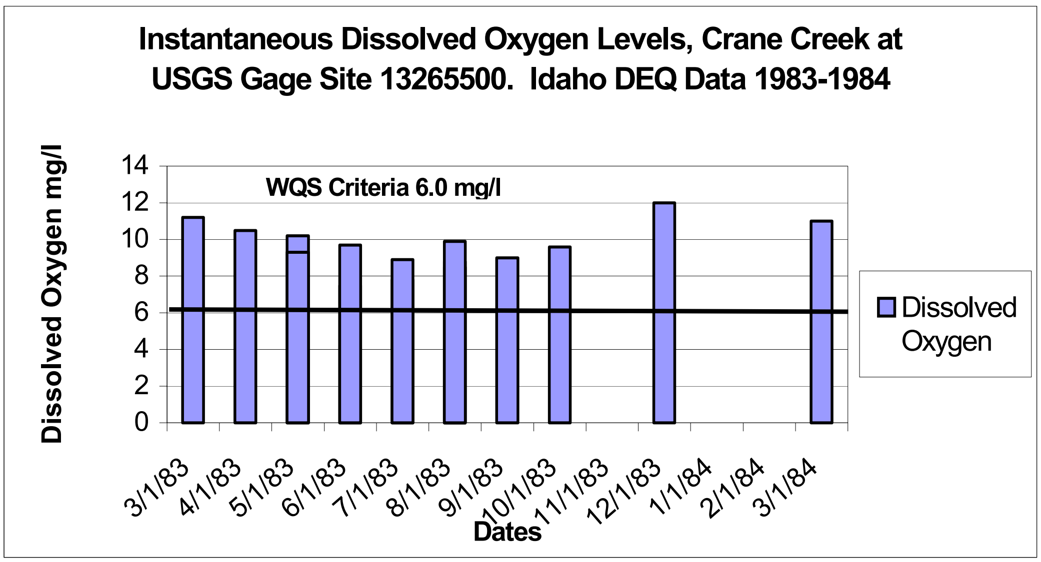


Figure 51. Instantaneous Dissolved Oxygen Levels, Crane Creek at USGS Gage No. 13265500. DEQ Data 1983-1984. Crane Creek, Crane Creek Reservoir to Weiser River.

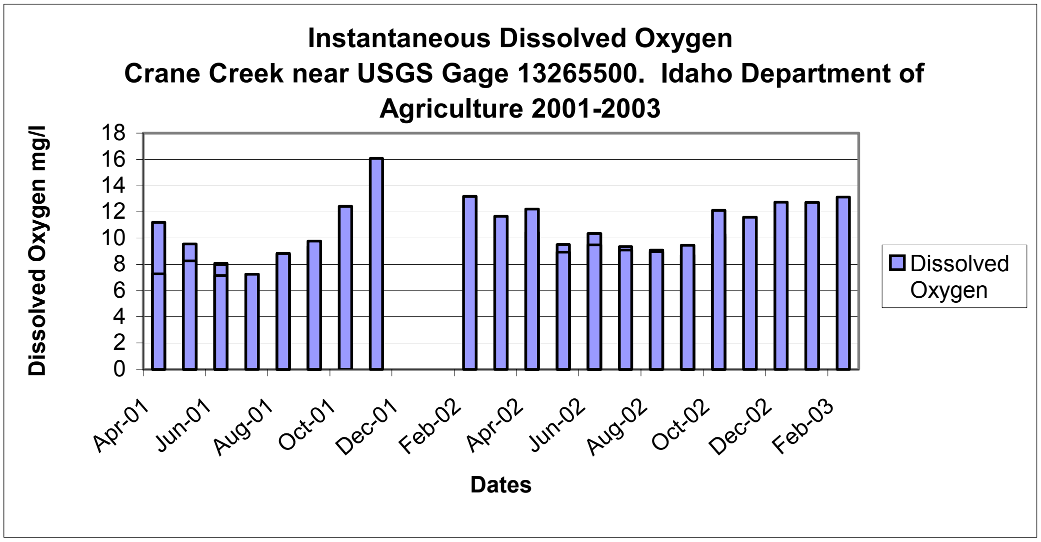


Figure 52. Instantaneous Dissolved Oxygen Levels, Crane Creek at USGS Gage No. 13265500. Idaho Department of Agriculture Data 2000-2003. Crane Creek, Crane Creek Reservoir to Weiser River.

It is unclear whether or not nutrients are impairing the water quality in Crane Creek. Water column data for dissolved oxygen do not appear to indicate a problem that may be associated with excessive nutrients. Periphyton information shows an organic load that may or may not indicate that nutrients are impairing the designated uses in Crane Creek.

However, it has been determined that nutrients entering the Snake River from the Weiser River Watershed are impairing the Snake River's beneficial uses. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has identified phosphorus as the nutrient of concern originating from the Weiser River Watershed and other watersheds discharging to the Snake River. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has set a total phosphorus target of 0.07 mg/L to prevent eutrophic conditions. This target has also been assigned to the major tributaries of the Snake River in southwestern Idaho and eastern Oregon (e.g., Payette River, Boise River, Malheur River, Owyhee River, and Weiser River). Current total phosphorus levels in the Weiser River exceed the total phosphorus target of 0.07 mg/L. This target must be met during the period from May through September. This period has been identified as the critical period to prevent nuisance aquatic growth in the Snake River and Brownlee Reservoir.

Sediment

Sediment is a pollutant of concern listed for Crane Creek. Macroinvertebrate and periphyton analyses indicate that sediment is impairing the designated uses within the creek. Additionally, the loading analysis for sediment for the lower and middle Weiser River indicate that reduction in sediment loading might be required from tributaries to achieve targets on the lower segments below the Little Weiser River confluence.

Data from the Idaho Department of Agriculture intensive study conducted during the years 20012003 were used to calculate TSS loading from Crane Creek. The results are shown in Table 57. Additional suspended sediment data are available in Appendix C. The studies shown in Appendix C were completed by USGS in various years and DEQ in 1983-84 and looked at suspended sediment and not TSS.

Table 57. Measured Total Suspended Solid Concentrations, Discharge, and Total Suspended Solids Load, near USGS Gage No. 13265500. Idaho Department of Agriculture 2000-2002. Crane Creek, Crane Creek Reservoir to Weiser River.

	TSS[a] Concentration (mg/L)[b]	Discharge (cfs)[c]	TSS Load (kg/day)[d]
Average	15.3	60.8	3,711
Standard Deviation	15.9	68.8	5,349
Maximum	64.0	202	21,291
Minimum	2.0	1.0	8
Count	38	38	38

a total suspended solids
b milligrams per liter
c cubic feet per second
d kilograms per day

As with total phosphorus loads calculated for the lower Weiser River and middle Weiser River, normalized discharge should also be calculated for the USGS gage site on Crane Creek for suspended sediment. The normalization of the discharge will assist in establishing suspended sediment loads and concentrations based on average daily discharges. Figure 53 shows the results of the regression analysis based on normalized discharge. Table 58 presents the normalized suspended sediment concentrations, discharge, and suspended sediment load based on the regression analysis.

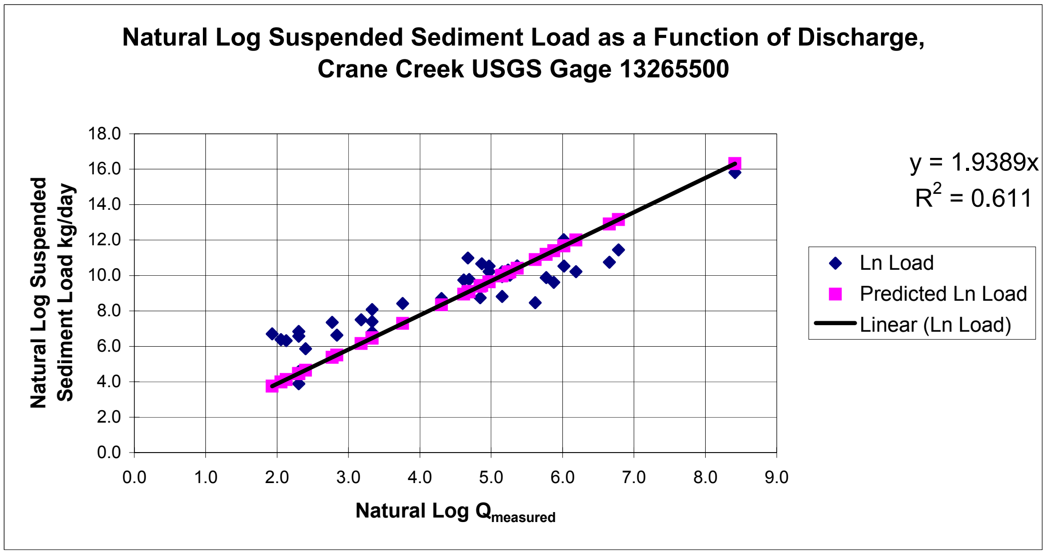


Figure 53. Regression Analysis for Suspended Sediment Load as a Function of Discharge. Crane Creek at USGS Gage No. 13265500. Crane Creek, Crane Creek Reservoir to Weiser River.

Further statistical analysis and comparison of measured and estimated suspended sediment concentrations and loads are presented in Table 58. Measured suspended sediment load and estimated suspended sediment load were analyzed to determine error or bias in calculations. Overall the measured TSS loads provided a lower percent difference than the estimated load.

Table 58. Measured and Estimated Total Suspended Solid Concentrations, Discharge, and Total Suspended Solids Load, USGS Gage No. 13265500. Crane Creek, Crane Creek Reservoir to Weiser River.

	Measured Discharge (cfs)[a]	Measured TSS[b] Concentration (mg/L)[c]	Measured TSS Load (kg/day)[d]	Estimated Discharge (cfs)	Estimated TSS Concentration (mg/L)	Estimated TSS Load (kg/day)
Average	60.8	15.3	3,711	82.1	19.3	6,162
Standard Deviation	68.8	15.9	5,349	67.5	14.2	8,512
Maximum	202	64.0	21,291	269	56.8	37,372
Minimum	1.0	2.0	8	7.4	2.4	43
Count	38	38	38	38	38	38
					Square Root Error	63,376
					% Difference Measure	5.9%
					% Difference Estimated	9.7%

a cubic feet per second
b total suspended solids
c milligrams per liter
d kilograms per day

Table 59 shows the estimated monthly flows, TSS loads, and TSS concentration for Crane Creek at USGS Gage No. 13265500.

The results from the TSS regression analysis provide a detailed daily and monthly sediment load and concentration analysis. However, the results from the modeling effort may underestimate high yield slugs of suspended sediment associated with the rising hydrograph, reservoir releases, and/or storm events. The sediment curve rating may equally overestimate long- and short-term suspended sediment averages. These over/under estimations will be examined in more detail in the development of a TMDL for this parameter.

Table 59. Estimated Monthly Total Suspended Solids Concentrations, Discharge, and Total Suspended Solids Loads at USGS Gage No. 13265500. Crane Creek, Crane Creek Reservoir to Weiser River.

Month	Estimated Discharge (cfs)[a]	TSS[b] Estimated Load (kg/day)[c]	TSS Estimated Concentration (mg/L)[d]
October	17.1	235	5.0
November	10.3	87	3.2
December	34.4	1,072	9.0
January	93.3	5,741	22.2
February	184	18,797	40.6
March	207	23,468	45.0
April	115	9,289	26.4
May	37.3	961	9.9
June	22.3	359	6.3
July	99.0	6,356	23.3
August	140	10,908	31.8
September	72.9	3,483	17.9

a cubic feet per second
b total suspended solids
c kilograms per day
d milligrams per liter

The TSS concentrations listed in Table 59 do not indicate that the water column component of the sediment load is at a level that would impair beneficial uses. Additional substrate and water column evaluations should be completed to determine impairment. In addition, a comparison of TSS and suspended sediment concentrations should be completed. Past water quality monitoring conducted by USGS has shown suspended sediment concentrations do exceed the recommended level.

Status of Beneficial Uses

Both the narrative and numeric criteria were examined for the listed pollutants of concern to determine beneficial use support status in Crane Creek. A biological assessment was conducted, and the resulting data were compared to indices developed and published in the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). Analysis of the biological communities revealed that sediment, a pollutant of concern listed on the 1998 Idaho §303(d) list, is impairing the designated uses established for Crane Creek. Impairment was noted by the lack of sediment intolerant species. However, water column concentrations did not exceed recommended concentrations. Additional substrate and water column assessments should be completed. *E. coli* bacteria exceeded concentrations needed to support contact recreation in Crane Creek. Table 60 provides information of the final assessment and status of the designated beneficial uses.

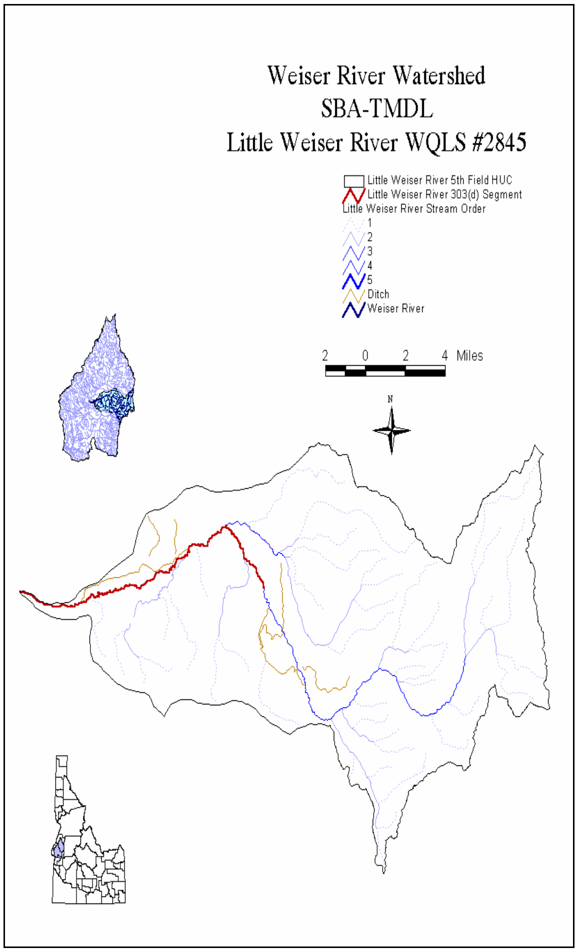
Table 60. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Crane Creek, Crane Creek Reservoir to Weiser River.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendations
Cold Water Aquatic Life	Not Supported	Sediment	Biological Assessment Indicated Impairment	Additional Monitoring Required for Sediment Impairment. Develop Total Phosphorus Allocations.[a]
Primary Contact Recreation	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Secondary Contact Recreational	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

Nutrient targets have also been established through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus in the lower Weiser River have shown that reduced levels must be reached in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These reductions will also be allocated to address nutrient loading from tributaries and upstream sources. Possible load allocations for total phosphorus for the Crane Creek Watershed are discussed in Section 3.2.

Little Weiser River, Indian Valley to Weiser River



Water Body	Little Weiser River, Indian Valley to Weiser River
Miles of impaired water body	17.3
Listed pollutants	Sediment and Nutrients (Bacteria monitoring in 2002 showed exceedances of criteria)
Potential impaired designated uses	Cold water aquatic life and primary contact recreation
Potential Sources	Overland flow, irrigation induced erosion, rangeland, streambank erosion

Discharge (Flow) Characteristics

An historic USGS (1920-1926) discharge gage (13261500) is located near the mouth of the Little Weiser River, approximately 3 miles upstream from the confluence with the Weiser River. The Little Weiser River discharges are regulated somewhat by irrigation water demand from upstream diversions. Water is diverted from the Little Weiser River to Ben Ross Reservoir. The diversion to the reservoir occurs near river mile 27, upstream of Indian Valley. Irrigation water is released from the reservoir for irrigation water use in the Indian Valley area. Other in-river diversions can also be found in the watershed, but most are used for gravity-fed delivery systems.

Figure 54 shows the normalized discharge recorded at USGS Gage No. 13261500, located near the mouth of the Little Weiser River. The available discharge data sources are listed in Appendix C.

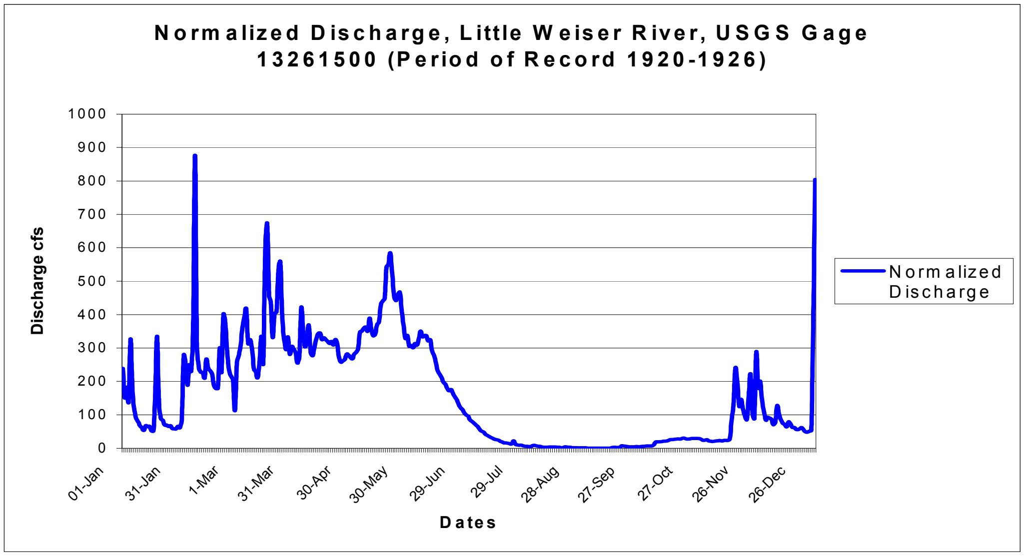


Figure 54. Normalized Average Daily Discharge at USGS Gage No. 13261500. Little Weiser River, Indian Valley to Weiser River.

The discharge data presented in Figure 54 were collected from the years 1920 to 1926. By contrast, USGS Gage No. 13261000, located above the Ben Ross Reservoir Diversion, has data on record dating from 1920 to 1972. This 52 years of data provides a better picture of daily discharge in the watershed. However, the total drainage area doubles between the two sites.

Discharge data from the upper site is usually associated with late spring snowmelt from higher elevations, while data from the lower site is usually associated with late winter and early spring snowmelt in the lower elevations. Figure 55 compares the two USGS sites.

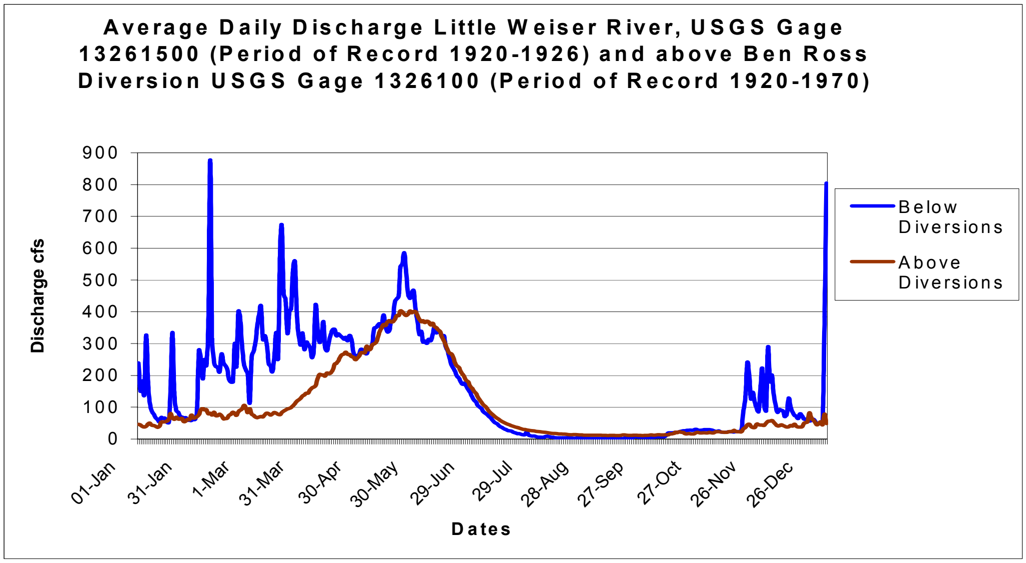


Figure 55. Normalized Average Daily Discharge at USGS Gage No. 13261500 below Ben Ross Reservoir Diversion and at USGS Gage No. 13261000 above Ben Ross Reservoir Diversion. Little Weiser River, Indian Valley to Weiser River.

During DEQ's intensive monitoring in the Weiser River Watershed during the years 2000-2001, one of the sites monitored was the Little Weiser River near the confluence with the Weiser River below Cambridge (Ingham 2000). Figure 56 shows the discharge results from DEQ monitoring conducted in during the years 2000-2001.

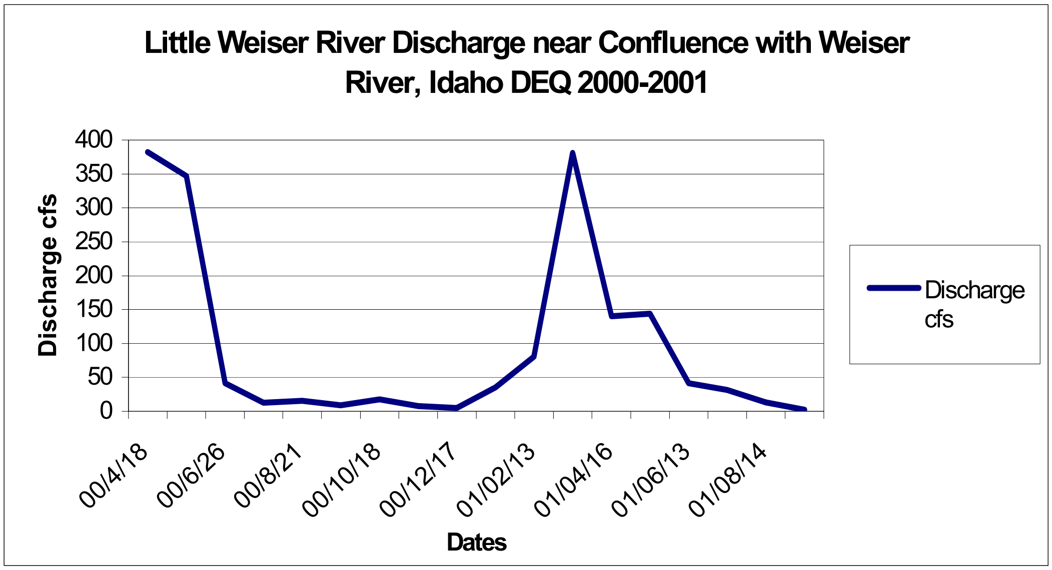


Figure 56. Discharge Results Little Weiser River near Confluence with Weiser River, near Cambridge, Idaho. DEQ 2000-2001. Little Weiser River, Indian Valley to Weiser River.

Biological and Other Data

Biological information is limited to three sites on the lower Little Weiser River. These data were collected as a part of Idaho BURP monitoring in the years 1996 and 2002. These three sites are all within the §303(d) listed segment. However, due to laboratory error, the macroinvertebrate samples collected in 1996 were destroyed. The 2002 macroinvertebrate data is provided in Table 62b. Periphyton samples were collected during the year 1996 and will also be evaluated in this biological assessment. The IDFG provided no fisheries information for the lower Little Weiser, and DEQ has never conducted fisheries evaluations in the lower part of this watershed. Appendix C contains information on the lower Little Weiser River BURP sites.

Periphyton

Periphyton samples were collected at one site in the year 1996 (1996BOIA072). This site is located approximately 6 miles east of Cambridge, Idaho, and approximately 9 miles upstream of the confluence with the Weiser River. Sample results were entered into the RDI developed by DEQ. The applicable metrics are discussed below.

The RDI scores in Table 61 show a high percentage of pollution tolerant and very motile species. The overall RDI score indicates a rating of a category 1. When this rating is averaged together with other indices (RMI, RFI, or RPI) and the average category rating is less than 2, cold water aquatic life is not fully supported (Grafe et al. 2002). However, when determining whether or not a certain pollutant is impairing designated uses, the high percentage of very motile species would indicate that sediment is affecting the community structure and composition. The high pollution tolerant percentage of alga species may also indicate organic loading (Bahls 2000 and 2001).

Table 61. River Diatom Index Scores. Little Weiser River, Indian Valley to Weiser River.

Metric	Little Weiser River near Confluence with Weiser River Metric Score	Little Weiser River near Confluence with Weiser River RDI[a] Score
% Pollutant Intolerant	50.5%	1
% Pollutant Tolerant	10.5%	1
Eutrophic Taxa Richness	18	3
% Nitrogen Heterotrophs	36.1%	1
% Polysaprobic	15.7%	1
Alkaliphilic Taxa Richness	24	3
% Requiring High Oxygen	21.3%	1
% Very Motile	13.4%	3
% Deformed	0%	5
Final River Diatom Index (RDI) Score		19
Final Condition Category Rating		1

a River Diatom Index, RDI Score<22=condition rating "1" RDI Score 22-33=condition rating "2" RDI Score >34=condition rating "3"

Fisheries

Fish were collected at BURP site 2002SBOIA015. The results are included in Table 62a.

Table 62a. Species Count and Stream Fish Index Scores, Little Weiser River BURP site 2002SBOIA015, near Cambridge

Species Found	Weiser River, Lower Canyon	
	Count	Percent of Total
Bridgelip sucker	8	15.0%
Speckled dace	14	27.0%
Frog	1	2.0%
Redside shiner	28	56%
Total Number	51	100%
SFI Score[a]	49	
Condition Rating	1	

Macroinvertebrates

Table 62b shows the RMI metrics, metric scores, and final index scores for two sites below Indian Valley.

Table 62b. Stream Macroinvertebrate Index Scores, Little Weiser River, Indian Valley to Weiser River.

Metric	2002SBOIA012	2002SBOIA015
Number of Taxa	34	29
Number EPT[a] Taxa	17	11
Percent Elmidae	5.74	14.59
Percent Dominate Taxa	38	21.9
Percent Predators	3.36	9.27
Total SMI Index Score	57.9	44.8
Condition Rating	2	2

a Ephemeroptera-Plecoptera-Trichoptera

Habitat

Habitat conditions were inventoried during the BURP monitoring in 2002. Table 62c includes the Stream Habitat Index scores and condition ratings at these two sites.

Site	2002SBOIA012	2002SBOIA015
Total SHI Index Score	54	34
Condition Rating	1	1

Table 62c. Stream Habitat Index Scores, Little Weiser River, Indian Valley to Weiser River

Water Column Data

Unlike the lower or middle Weiser River, the Little Weiser River has limited water quality data. Appendix C contains data source descriptions of available data that will assist in determining the support status of the designated uses and the loading capacity required for the lower and middle Weiser River and for the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

The USGS conducted some limited monitoring immediately below the confluence with the Weiser River for suspended sediment in during the years 1981 and 1982. DEQ conducted an intensive 18-month study in the Weiser River Watershed from the year 2000 through 2001. One monitoring site was located on the Little Weiser River near the confluence with the Weiser River, west of Cambridge, Idaho. Appendix C contains information on the data sources.

Each of the listed pollutants of concern will be discussed separately. Recommendations will then be made to address those pollutants related to the Little Weiser River and the

Weiser River and to address the targets established in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

Bacteria

The Little Weiser River is designated for primary contact recreation (IDAPA 58.01.02.140.18.SW-3). The WQS definition and criteria for primary contact recreation can be found in Section 2.4. Bacteria are not currently listed on the 1998 Idaho §303(d) list as a pollutant of concern in the Little Weiser River (Idaho DEQ 1998*a*).

During the 2002 BURP monitoring, one bacteria sample exceeded the single sample criterion for *E. coli*. This exceedence of the criterion triggered additional monitoring to determine further compliance or non-compliance of the *E. coli* geometric mean criterion in accordance with IDAPA 58.01.02.251.01.c. The results for the geometric mean for Little Weiser River are shown in Table 63, and the individual sample results are located in Appendix C.

The data indicate that *E. coli* bacteria exceeded concentrations needed to support contact recreation in the Little Weiser River.

Table 63. *E. coli* Geometric Mean Results, Year 2002. Little Weiser River, Indian Valley to Weiser River.

Station Location	Month and Year of Data	Number of Samples	*E. coli* Geometric Mean (cfu/100 ml)[a]
Little Weiser River at BURPID 2002SBOIA015[b]	August 2002	5	661

a Colony forming units per 100 milliliters
b BURPID2002BOIA015 is located 50 meters upstream of the confluence with the Weiser River

Nutrients

Unlike the constituents discussed above, there is no numeric WQS criterion for nutrients. The WQS is a narrative criterion as described in IDAPA 52.01.02.200.06. A discussion of the nutrient criterion is located in Section 2.3.

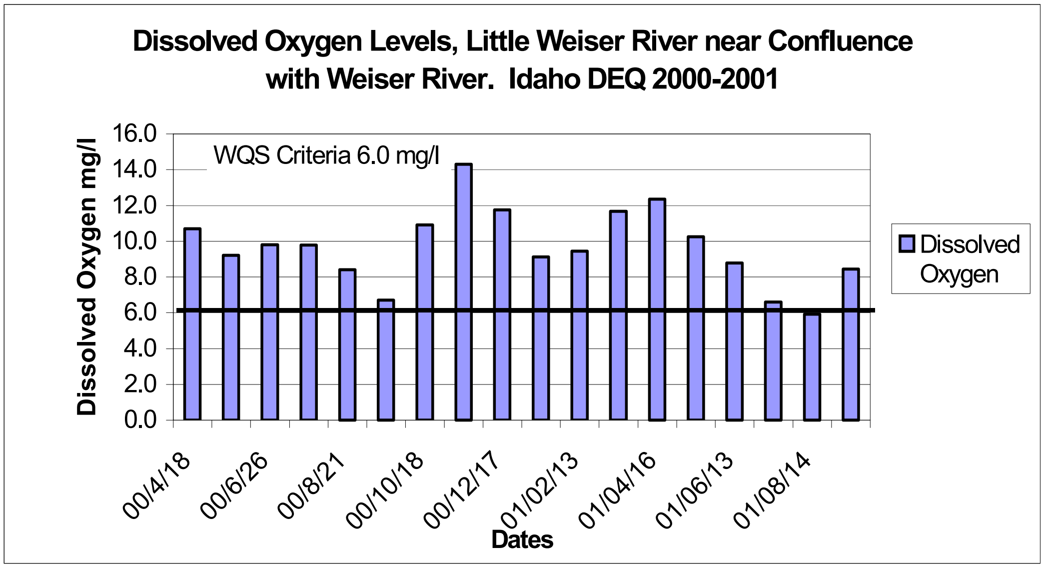


Figure 57. Instantaneous Dissolved Oxygen Levels, Little Weiser River near Confluence with Weiser River. DEQ Data 2000-2001. Little Weiser River, Indian Valley to Weiser River.

Instantaneous measurement of dissolved oxygen taken from the year 2000 –to 2002 by DEQ showed no exceedances of the Idaho WQS for water column dissolved oxygen levels. Twenty-four-hour monitoring was not conducted.

It is not clear whether or not nutrients are impairing the water quality in the Little Weiser River. Water column data for dissolved oxygen indicated only 5.6% of samples collected were less that the WQS criterion of 6.0 mg/L. With this in mind, it is unlikely that excessive nutrients are contributing to impairment with regards to dissolved oxygen. Current EPA guidance states that a violation occurs when 10% or more of the samples for a parameter do not meet the WQS. However, available periphyton data may be indicative of an organic load that may or may not mean that nutrients are impairing the designated uses in the Little Weiser River. The low percentage (21.3%) of high oxygen-requiring periphyton species may mean that low dissolved oxygen concentrations may be impairing cold water aquatic life. The increased percentage (15.7%) of polysaprobic species may indicate an organic load that impairs cold water aquatic life.

However, as seen in the Weiser River downstream of the Little Weiser River, nutrients entering the Snake River from the Weiser River Watershed are contributing to the impairment of the Snake River's beneficial uses. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has identified phosphorus as the nutrient of concern originating from the Weiser River Watershed and other watersheds discharging to the Snake River. The *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004) has set a total phosphorus target of 0.07 mg/L to prevent eutrophic conditions. This target must be met from May through September and has been identified as critical to prevent nuisance aquatic growth in the Snake River and Brownlee Reservoir. Possible allocations for the Little Weiser River are discussed in Section 3.2.

Sediment

It is not known if sediment is causing an impairment of beneficial uses in the Little Weiser River. Biological indicators show a high presence of sediment tolerant species. Further analysis of macroinvertebrate data will assist in determining if sediment is impairing the beneficial uses.

As discussed in Section 2.4, substrate composition will affect biological communities and structure. In August 2003, DEQ evaluated the substrate at three locations on the Little Weiser River. Table 64 shows the percentage of the substrate that is less than 6.0 mm in size.

Table 64. Percent Substrate Less Than 6 Millimeters in Size. Little Weiser River, Indian Valley to Weiser River.

	Little Weiser River
Percent of Substrate Less than 6 mm in Size	13.0%

Status of Beneficial Uses

Both the narrative and numeric criteria were examined for the listed pollutants of concern to determine beneficial use support status in the Little Weiser River. A biological assessment was conducted, and the data were compared to indices developed and published in the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). Analysis of the biological communities revealed that sediment, a pollutant of concern listed on the 1998 Idaho §303(d) list, is in all likelihood impairing the designated uses established for Little Weiser River. Analyses of the BURP data from the two sites below Indian Valley indicate that the river is not fully supporting beneficial uses. This is based on the average of the condition ratings of the stream macroinvertebrate, fish and habitat monitoring. To be considered full support a stream must have a final average score of at least “2”. BURP site 2002SBOIA012 scored “1.5”, and site 2002SBOIA015 scored “1.33”. Although not totally clear from the available data, nutrients are at levels that could impair designated uses. This conclusion is based on high levels of total phosphorus and the periphyton indicator species. Through water quality monitoring and biological assessment, it was also determined that *E. coli* bacteria are impairing designated uses on the Little Weiser River. Two BURP monitoring sites in the upper Little Weiser River watershed on the Payette National Forest (2002SBOIA013 and 2002SBOIA014) were full support. Table 65 provides information of the final assessment and status of the designated beneficial uses.

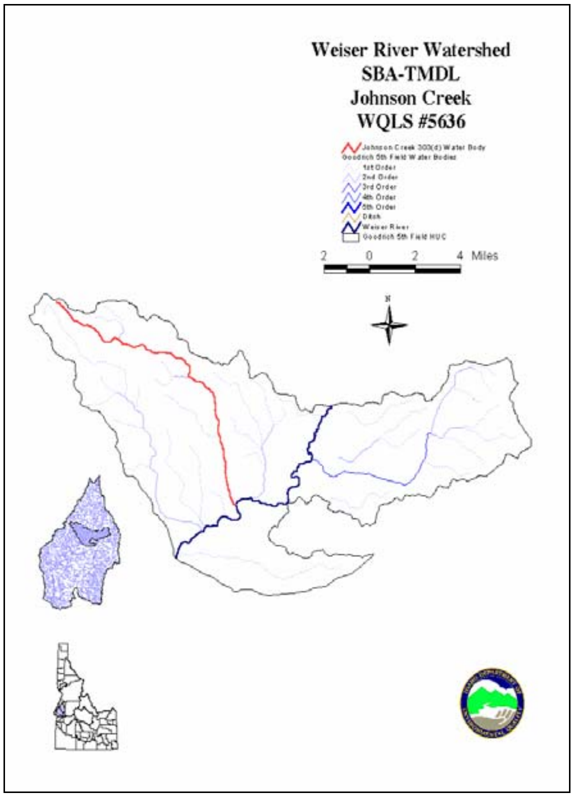
Table 65. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Little Weiser River, Indian Valley to Weiser River.

Designated Use	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Not Supported	Sediment	Biological Assessment Indicated Impairment	Develop Sediment TMDL. Develop Total Phosphorus Allocations.[a]
Primary Contact Recreation	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Secondary Contact Recreational	Not Supported	Bacteria	Numeric Criteria Exceeded	Develop TMDL to Address Bacteria
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

In addition to protecting the designated uses for the Little Weiser River, nutrient targets have been established through the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Evaluation and modeling for total phosphorus in the lower Weiser River have shown that reduced levels must occur in this segment to achieve the targets outlined in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). These reductions will be allocated to address nutrient loading from tributaries and upstream sources also. The Little Weiser River is a major tributary to the lower and middle Weiser River. Possible load allocations are discussed in Section 3.2.

Johnson Creek, Headwaters to Weiser River



Water Body	Johnson Creek, Headwaters to Weiser River
Miles of Impaired Water Body	13.7
Listed Pollutants	Unknown
Potential Impaired Designated Uses	Cold water aquatic life and salmonid spawning
Potential Sources	Forest practices and overland flow

Biological Data

Based on a biological assessment using BURP data from the years 1994 and 1995, Johnson Creek is classified as fully supporting its designated uses. Table 66 shows the final assessment scores and the condition rating based on the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). Based on the index scores shown below, Johnson Creek is fully supporting its designated uses.

Table 66. Beneficial Use Reconnaissance Program Index Scores for Johnson Creek. Johnson Creek, Headwaters to Weiser River.

BURP[a] Site ID No.	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	SFI[d] Score	Condition Rating	Final Condition Rating	Support Status
1994SBOI A063	65.59	3	28	1	NA	NA	2	Full Support
1995SBOI B036	59.56	3	63	3	38.33	1	2.3	Full Support
2002SBOI A016	58.7	2	66	3	92.00	3	2.3	Full Support
2002SBOI A017	73.5	3	82	3	NA	NA	3	Full Support

a Beneficial Use Reconnaissance Program
b Stream Macroinvertebrate Index
c Stream Habitat Index
d Stream Fish Index

Based on the scores presented in Table 66, no further assessment is required on Johnson Creek. Johnson Creek, should be removed as an impaired water body on future Idaho §303(d) lists.

Status of Beneficial Uses

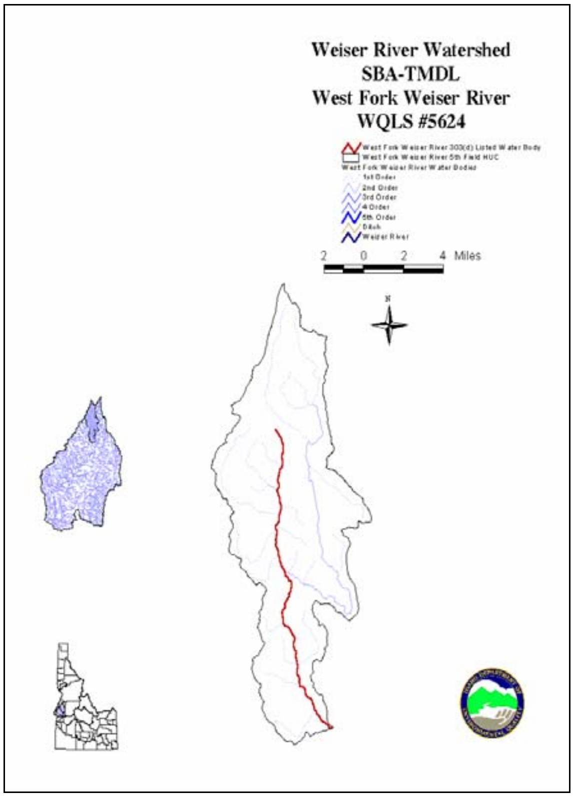
Table 67 shows the status for all designated uses in Johnson Creek, the pollutants impairing those uses, justifications, and recommendations.

Table 67. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. Johnson Creek, Headwaters to Weiser River.

Designated Uses	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Fully Supported		Assessment Shows Full Support	No Action to be Taken/ Remove from 303(d) list
Salmonid Spawning	Fully Supported		Assessment Shows Full Support	No Action to be Taken/ Remove from 303(d) list
Primary Contact Recreation	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Secondary Contact Recreational	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Drinking Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

It is unlikely that a nutrient or sediment load reduction will be placed on Johnson Creek. Therefore, allocations from tributaries will not be required based on the analysis completed on downstream segments.

West Fork Weiser River, Headwaters to Weiser River



Water Body	West Fork Weiser River, Headwaters to Weiser River
Miles of impaired water body	15.9
Listed pollutants	Unknown
Potential Impaired designated uses	Cold water aquatic life and salmonid spawning
Potential sources	Forest practices, irrigated induced erosion, roads, overland flow

Biological Data

A biological assessment was completed on the West Fork Weiser River pursuant to the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). In the year 2002, BURP monitoring was conducted. The results from that monitoring indicate that this stream segment is fully supporting its beneficial uses.

Table 68. Beneficial Use Reconnaissance Program Index Scores for the West Fork Weiser River. West Fork Weiser River, Headwaters to Weiser River.

BURP[a] Site ID No.	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	SFI[d] Score	Conditio n Rating	Final Condition Rating	Support Status
1993SBOI025	63.76	3	19	1	NA[e]	NA	2	Full Support
1993SBOI026	55.76	2	20	1	NA	NA	1.5	Not Full Support
2002SBOIA018	56.6	2	63	2	84	3	2.33	Full Support
2002SBOIA019	87.5	3	80	3	NA	NA	3	Full Support

a Beneficial Use Reconnaissance Program
b Stream Macroinvertebrate Index
d Stream Habitat Index
d Stream Fish Index
e Results unavailable for 1993

Status of Beneficial Uses

Table 69 shows the status for all designated uses in the West Fork Weiser River, the pollutants impairing those uses, justifications, and recommendations.

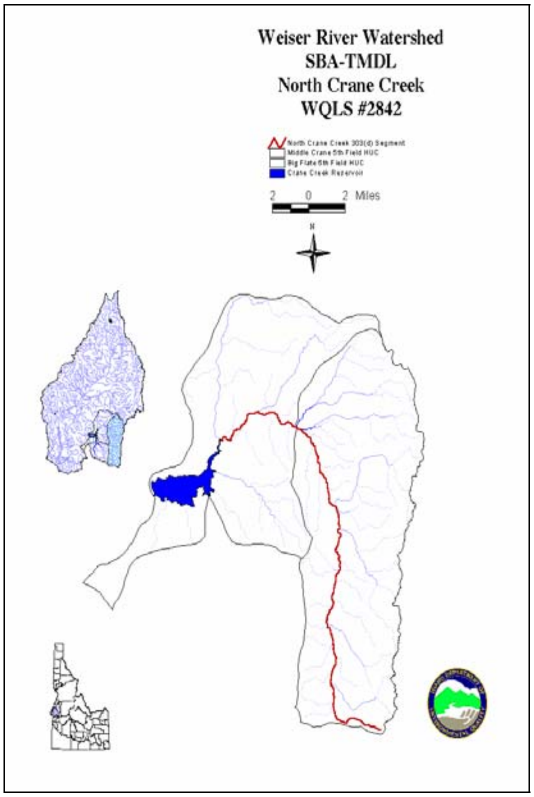
Table 69. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. West Fork Weiser River, Headwaters to Weiser River.

Designated Uses	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Fully Supported		Assessment Shows Full Support[a]	No Action to be Taken/ Remove from 303(d) list.
Salmonid Spawning	Fully Supported		Assessment Shows Full Support[a]	No Action to be taken/ Remove from 303(d) list.
Primary Contact Recreation	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Secondary Contact Recreational	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Drinking Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Support status determined by Idaho DEQ Water Body Assessment Guidance *(Grafe et al. 2002). Additional data required to make full assessment*

It is unlikely that a nutrient or sediment load reduction will be placed on the West Fork Weiser River. Therefore, allocations from tributaries will not be required based on the analysis completed on downstream segments.

North Crane Creek, Headwaters to Crane Creek Reservoir



Water Body	**North Crane Creek Headwaters to Crane Creek Reservoir**
Miles of impaired water body	24.7
Listed pollutants	Sediment, Temperature, Bacteria, Nutrients, and Flow
Potential impaired designated uses	No designated uses
Potential sources	Overland flow, irrigation induced erosion, rangeland, stream bank erosion

Flow Characteristics

North Crane Creek originates in the rolling, sagebrush-covered hills northeast of Weiser, Idaho. As with most water bodies in the southern portion of the watershed, discharge from the watershed is usually associated with snowmelt, rain-on-snow events, and summertime thunderstorms. There are no major impoundments on North Crane Creek. Numerous small stock ponds can be found throughout the watershed on smaller first and second order water bodies. In the lower elevations, the water body meanders through a wide valley with irrigated pastures and hayfields as the dominant land uses along the stream corridor. Rangeland makes up the dominant upland land use.

No information could be found concerning discharge from the North Crane Creek Watershed in USGS discharge records. In the year 2000, the Idaho Department of Agriculture began intensive monitoring in the lower Weiser River Watershed. The discharge data from this monitoring were the only data found that cover a substantial period. The Idaho Department of Agriculture data are presented in Figures 58 and 59. Since discharge data showed substantial periods of no discharge, bar graphs are provided rather than line graphs. Appendix C contains information on data sources.

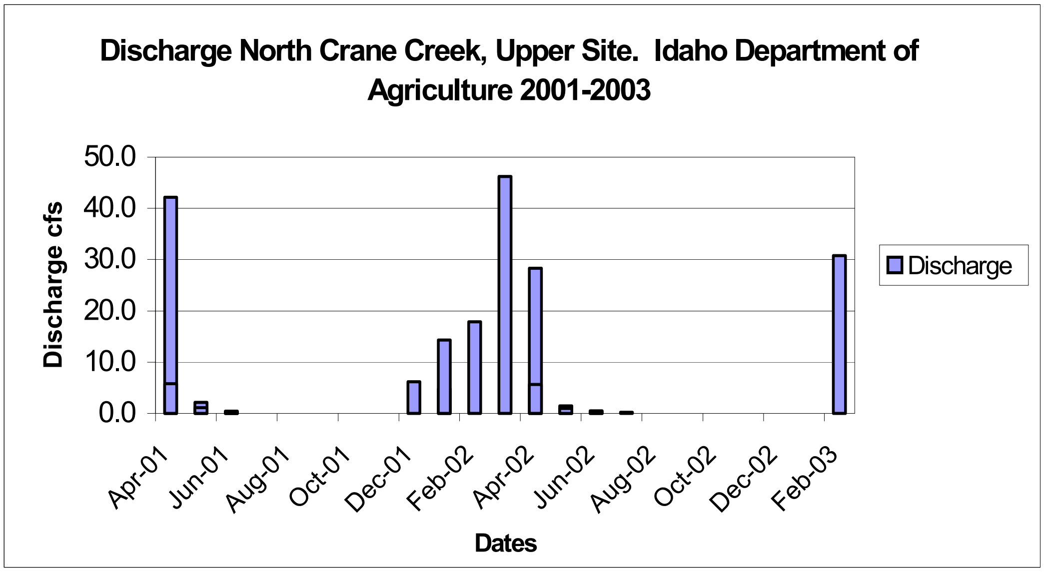


Figure 58. Discharge 2001-2002, Idaho Department of Agriculture, Upper North Crane Creek Site. North Crane Creek, Headwaters to Crane Creek Reservoir.

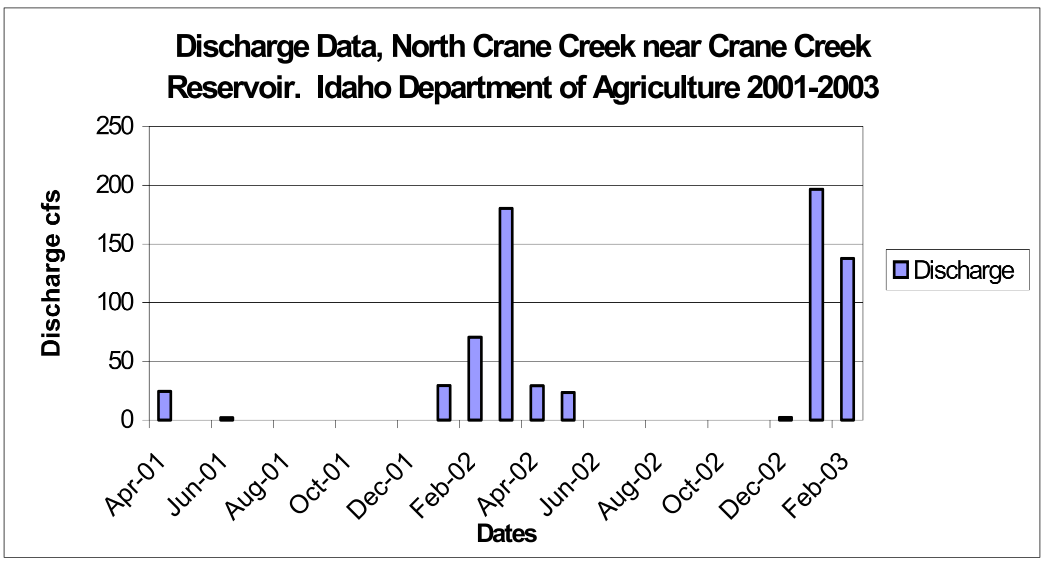


Figure 59. Discharge 2001-2003, Idaho Department of Agriculture, Lower North Crane Creek Site. North Crane Creek, Headwaters to Crane Creek Reservoir.

As shown in Figures 58 and 59, North Crane Creek is best described as intermittent. As recorded in the two years of discharge data from the Idaho Department of Agriculture, the period from July through December had zero discharge for both years, at both stations. A discussion of applicable WQS and intermittent waters can be found in Section 2.3.

The peak discharges are short in duration and are dependent on snowmelt and storm events. These periods are not optimal for the support of cold water aquatic life and will not provide adequate habitat for long term biological communities. Recreational use is not usually associated with short duration peak discharges.

Biological and Other Data

DEQ BURP monitoring occurred on two sites on the §303(d) listed segment. Both sites were evaluated in the year 1998. Table 70 shows the results of the BURP monitoring effort and the related index scores that will assist in determining the support status of the designated uses (Grafe et al. 2002).

Table 70. Available Biological Data for North Crane Creek, Headwaters to Crane Creek Reservoir.

BURP[a] ID No.	Date	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	Final Condition Score
1995SBOIA001	5/24/95	15.73	Below Threshold			Not Fully Supporting
1996SBOIB022	6/20/96	22.51	Below Threshold			Not Fully Supporting
1997SBOIB010	6/17/97	14.40	Below Threshold			Not Fully Supporting
1997SBOIB011	6/18/97	32.03	Below Threshold			Not Fully Supporting
1997SBOIB012	6/18/97	22.01	Below Threshold			Not Fully Supporting

a Beneficial Use Reconnaissance Program
b Stream Macroinvertebrate Index
c Stream Habitat Index
d No Data
e Not Applicable

In accordance with the *Water Body Assessment Guidance* (Grafe et al. 2002), when the average of two index condition rating scores is equal to or greater than 2, the water body is considered fully supporting beneficial uses. Or, if one of the index scores is below the threshold value, the water body is not fully supporting cold water aquatic life. However, the intermittent water body criteria will apply. That is, if a water body has zero flow, the aquatic community indices cannot be used (Grafe et al. 2002). Numeric criteria still apply during periods of optimal flow. Therefore, further analysis of the impairment to beneficial uses and possible load allocations would be applied as described in IDAPA 58.01.02.003.53 and in IDAPA 58.01.02.70.06 and .70.07.

Water Column Data

Although there is no apparent impairment to beneficial uses after examining biological indicators in North Crane Creek, due to the stream's intermittent nature, further analysis of nutrient and sediment data may be warranted since load allocations for both parameters may be set for the lower Weiser River. Appendix C contains data source information.

Bacteria

Bacteria are a listed pollutant for North Crane Creek. A discussion of applicable criteria and contact recreation WQS is presented in Section 2.3.

Appendix C contains the results from Idaho Department of Agriculture bacteria monitoring that was conducted at two locations on North Crane Creek. Data collected in the years 2001 through 2003 show an exceedence of the single sample criterion for *E. coli* bacteria for primary contact recreation (IDAPA 58.01.02.251.01.b.). This exceedence does not necessarily mean that a violation of WQS is occurring, but it does trigger a requirement for additional bacteria monitoring to be conducted on the water body (IDAPA 58.01.02.80.03). That is, additional monitoring is needed to determine compliance with a more stringent geometric mean criterion.

In June 2003, DEQ conducted the additional monitoring required under IDAPA 58.01.02.80.03. The site selected is located approximately 5 miles upstream of the backwaters of Crane Creek Reservoir. These monitoring data are presented in Table 71.

Table 71. Geometric Mean and Individual *E. coli* Results, DEQ June- July 2003. North Crane Creek, Headwaters to Crane Creek Reservoir.

Station Location	Location	Date	E. coli (cfu/100 ml)[a]
North Crane Creek	5 miles upstream of reservoir	06/26/2003	15
North Crane Creek	5 miles upstream of reservoir	06/30/2003	31
North Crane Creek	5 miles upstream of reservoir	07/08/2003	110
North Crane Creek	5 miles upstream of reservoir	07/15/2003	23
North Crane Creek	5 miles upstream of reservoir	07/21/2003	120
		Geometric Mean	43

a colony forming units per 100 milliliters

The results presented in Table 71 indicate that the WQS criterion for primary contact recreation is fully supported.

Temperature

See the Addendum to the Weiser River Subbasin Assessment and TMDL for information about the Potential Natural Vegetation (PNV) temperature TMDL.

Nutrients

Nutrients are listed as a pollutant of concern for North Crane Creek. Since North Crane Creek is an intermittent water body, it is not possible to determine whether nutrients are impairing the designated beneficial uses. However, there may be a required reduction in nutrients to achieve potential targets set for the lower Weiser River and/or the lower Snake River. A discussion of possible allocations for North Crane Creek is located in Section 3.2.

Status of Beneficial Uses

North Crane Creek is an intermittent water body. As such, application of the WQS addressing intermittent water bodies will be applied. Table 72 provides information on the final assessment and status of the designated beneficial uses.

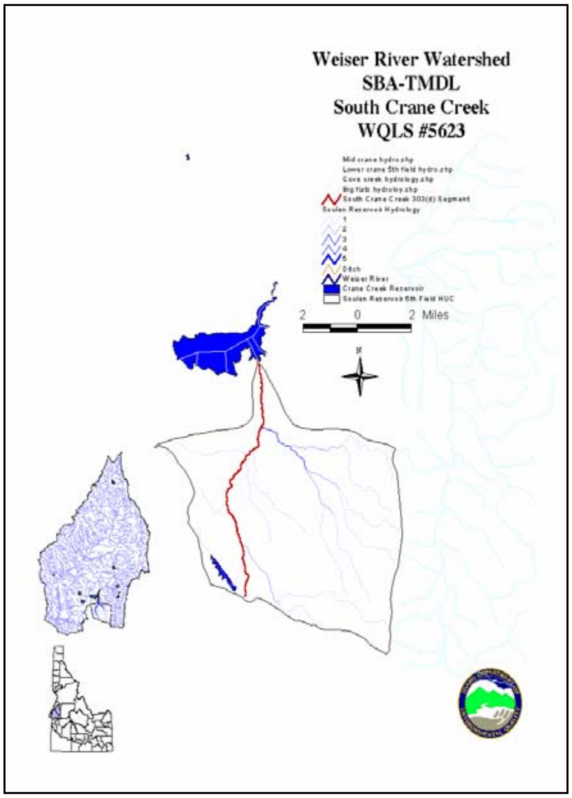
Table 72. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. North Crane Creek, Headwaters to Crane Creek Reservoir.

Existing Uses	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Not an Existing Use		Application of Intermittent Water Body WQS[a]	Remove from 303(d) list – Intermittent Water Body. Develop Total Phosphorus Allocations[b].
Primary Contact Recreation	Not an Existing Use		Application of Intermittent Water Body WQS	Remove from 303(d) list – Intermittent Water Body
Secondary Contact Recreational	Existing Use		Bacteria Data Indicate Full Support	Remove from 303(d) list – Intermittent Water Body
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Water quality standards
b Total phosphorus allocations are necessary to address nutrient targets established in the Snake River-Hells Canyon SBA-TMDL *(Idaho DEQ and Oregon DEQ 2004).*

Although North Crane Creek has been determined to be intermittent, nutrient and sediment targets may be established for the lower Weiser River and the lower Snake River. North Crane Creek may be required to meet these targets. These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Along with total phosphorus, sediment targets may need to be established for the tributaries of the lower Weiser River and North Crane Creek. Also see the Addendum to the Weiser River Subbasin Assessment and TMDL for information about the Potential Natural Vegetation (PNV) temperature TMDL.

South Crane Creek, Headwaters to Crane Creek Reservoir



Water Body	South Crane Creek Headwaters to Crane Creek Reservoir
Miles of impaired water body	9.2
Listed pollutants	Unknown
Potential impaired designated uses	No designated uses
Potential sources	Overland flow, irrigation induced erosion, rangeland, stream bank erosion

Discharge (Flow) Characteristics

South Crane Creek originates in the rolling, sagebrush covered hills northeast of Weiser, Idaho. As with most water bodies in the southern portion of the watershed, discharge from the watershed is usually associated with snowmelt, rain-on-snow events, and brief, sometimes heavy, summertime thunderstorms. Water diversion and storage occur in Soulen Reservoir, a 100- to 150-acre reservoir located in the headwaters. It is assumed that Soulen Reservoir provides livestock water and irrigation water storage for agricultural land further downstream.

In the lower elevations, South Crane Creek meanders through a wide valley, with irrigated pasture and hayfields as the dominant land uses along the stream corridor. Small impoundments can be found throughout the watershed. Two larger impoundments, approximately 10 to 20 acres each, can be found in the Tennison Creek Watershed, the only large water body that contributes discharge to South Crane Creek.

No historic USGS discharge records could be found concerning discharge from the South Crane Creek Watershed. In the year 2000, the Idaho Department of Agriculture began intensive monitoring in the lower Weiser River Watershed. Data from this monitoring effort were the only data found that cover a substantial period. The Idaho Department of

Agriculture data are presented in Figure 60. Appendix C contains a description of the data sources for South Crane Creek.

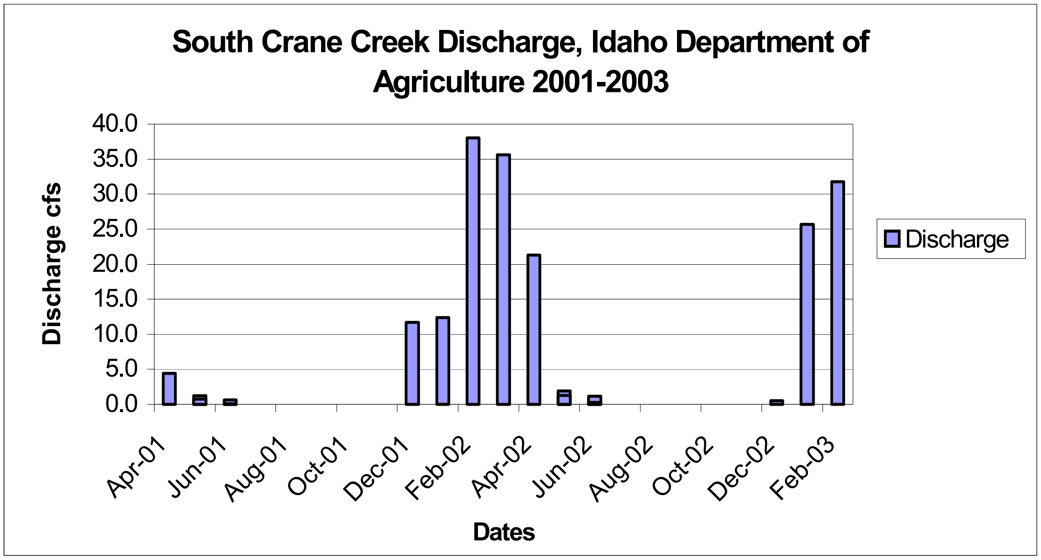


Figure 60. Discharge 2000-2003, Idaho Department of Agriculture. South Crane Creek, Headwaters to Crane Creek Reservoir.

South Crane Creek can best be described as intermittent. In the two years of discharge data from the Idaho Department of Agriculture, the period from July through December had zero discharge during both years. Additional discussion concerning applicable WQS and criteria is located in Section 2.3.

The peak discharges in South Crane Creek are short in duration and are dependent on snowmelt and storm events. These periods are not optimal for the support of cold water aquatic life and will not provide adequate habitat for long-term biological communities. Recreational use is not usually associated with short–duration, peak discharges.

Biological and Other Data

BURP monitoring occurred on two sites on the §303(d) listed segment. Both sites were evaluated in the year 1998. Table 73 shows the results of the BURP monitoring and the related index scores that will assist in determining the support status of the designated uses (Grafe et al. 2002).

Table 73. Biological Assessment of South Crane Creek, Headwaters to Crane Creek Reservoir.

BURP[a] ID No.	Date	SMI[b] Score	Condition Rating	SHI[c] Score	Condition Rating	Final Condition Score
1995SBOIB001	5/25/95	12.07	Below Threshold			Not Fully Supporting
1998SBOIB024	6/30/98	26.70	Below Threshold			Not Fully Supporting
1998SBOIB025	6/30/98	Dry	NA[d]	Dry	NA	NA

a Beneficial Use Reconnaissance Program
b Stream Macroinvertebrate Index
c Stream Habitat Index
d Not Applicable

In accordance with the *Water Body Assessment Guidance* (Grafe et al. 2002), when an average of two index condition rating scores is equal to or greater than 2, the water body is considered fully supporting its beneficial uses. Or, if one of the index scores is below the threshold value, the water body is not fully supporting cold water aquatic life. However, as an intermittent water body, intermittent water body criteria apply.

Water Column Data

Biological indicators do not show impairment to beneficial uses in South Crane Creek. Further analysis of nutrient and sediment data may be warranted since load allocations for both parameters may be set for the lower Weiser River. A discussion of possible allocations can be found in Section 3.2.

Nutrients

Nutrients are not listed as a pollutant of concern for South Crane Creek. Since South Crane Creek is an intermittent water body, there are no biological indications that nutrients are impairing the designated beneficial uses. However, there may be a required reduction in nutrients to achieve potential targets set for the lower Weiser River and the lower Snake River. A discussion of possible allocations is located in Section 3.2.

Status of Beneficial Uses

South Crane Creek is an intermittent water body. As such, application of the WQS addressing intermittent water bodies will be applied. Table 74 provides information on the final assessment and status of the designated beneficial uses.

Table 74. Support Status of Designated Beneficial Uses, Pollutants Impairing Those Uses, Justifications, and Recommendations. South Crane Creek, Headwaters to Crane Creek Reservoir.

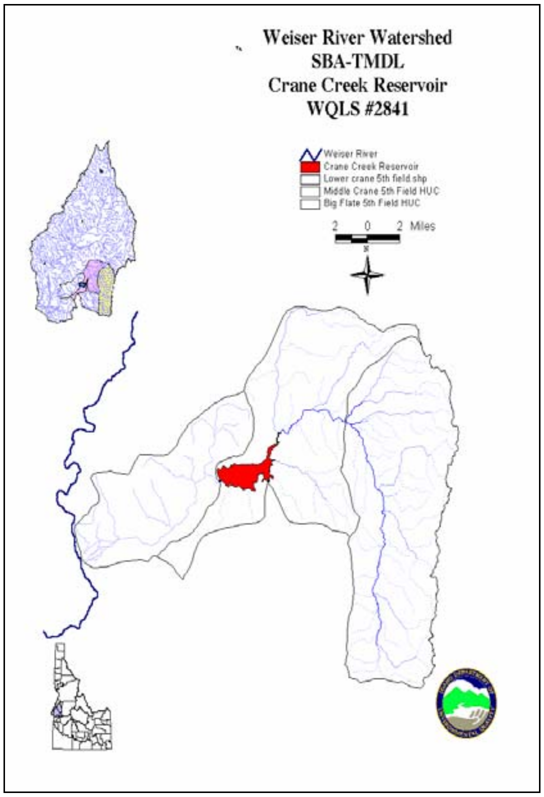
Existing Uses	Support Status	Pollutants Impairing Use	Justification	Recommendation
Cold Water Aquatic Life	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS[a]	Develop Total Phosphorus Allocations[b]
Primary Contact Recreation	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS	No Action to be Taken
Secondary Contact Recreational	Not an Existing Use	Not Evaluated	Application of Intermittent Water Body WQS	No Action to be Taken
Drinking Water Supply	Not an Existing Use	Not Evaluated		No Action to be Taken
Agricultural Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Industrial Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Wildlife Water Supply	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken
Aesthetics	Presumed to be Fully Supported	Not Evaluated		No Action to be Taken

a Water quality standards

b Total phosphorus allocations are necessary to address nutrient targets established in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004).

Although South Crane Creek has been determined to be intermittent, nutrient and sediment targets may be established for the lower Weiser River and the lower Snake River. South Crane Creek may be required to meet these targets. These targets have been established for total phosphorus to prevent eutrophic conditions in the Snake River and downstream reservoirs. Along with total phosphorus, sediment targets may need to be established for the tributaries of the lower Weiser River. A discussion of possible allocations can be found in Section 3.2.

Crane Creek Reservoir



Water Body	Crane Creek Reservoir
Miles of impaired water body	Reservoir, 1,507 acres
Listed pollutants	Sediment and nutrients
Potential impaired designated uses	Cold water aquatic life
Potential sources	Overland flow, irrigation induced erosion, rangeland stream bank erosion, in-reservoir conditions

Discharge (Flow) Characteristics

Crane Creek Reservoir, located northeast of Weiser, Idaho, is a 1,507-acre, manmade reservoir with a maximum water storage capacity of 56,800 acre feet. The dam height is 55 feet. The dam and reservoir are owned and operated by the Crane Creek Irrigation District (Idaho Department of Water Resources 1971).

Some USGS discharge records are available for Crane Creek Reservoir releases from the years 1911 through 1969 (USGS Gage No. 13264500). Dam construction was completed in 1929, with water storage beginning that year. A comparison of pre-dam and post-dam construction discharge data indicates that Crane Creek was an intermittent water body before the dam was built. Reservoir storage is mainly spring snow melt occurring from February through April. Figure 61 shows the discharge at the USGS gage site below the reservoir for both pre-dam and post-dam construction. Appendix C contains information on discharge data sources.

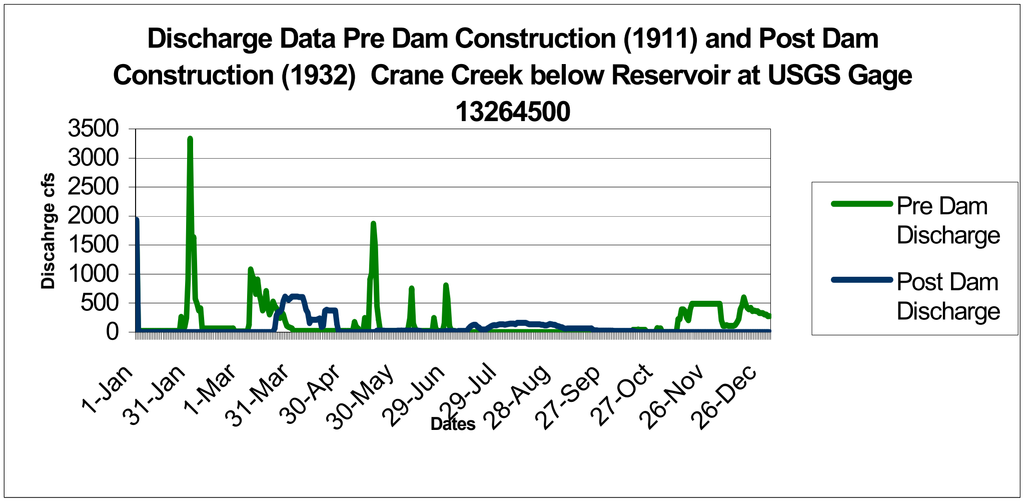


Figure 61. Crane Creek below Crane Creek Reservoir Outlet, Pre-Dam Construction (1911) and Post Dam Construction (1932), USGS Gage No. 13264500. Crane Creek Reservoir.

Action on Crane Creek Reservoir will be delayed until 2007 to allow further study and assess the status and appropriateness of designated uses.

2.6 Conclusions

Since the publication of Idaho's 1998 §303(d) list, additional information has been collected to verify the support status of the water quality limited segments. As presented in Section 2.5, an extensive evaluation has occurred to determine the status of beneficial uses and the impact of pollutants on those uses. As a result, some modifications to the 1998 §303(d) list are warranted, and in other situations, the preparation of a TMDL is justified. Table 75 recommends actions to be taken on the 1998 §303(d) listed water bodies.

Table 75. Final Conclusions on Assessment, Impaired Uses, and Recommendations for 1998 §303(d) Listed Water Bodies. Weiser River Watershed.

Water Body	Segment Boundaries	Beneficial Uses Impaired	Recommended Actions
Lower Weiser River	Galloway Dam to Snake River	Cold Water Aquatic Life, Primary and Secondary Contact Recreation	Develop TMDLs to Address: Sediment, Bacteria, and Temperature. Remove Dissolved Oxygen as Pollutant of Concern. Develop Load Allocations for Total Phosphorus
Middle Weiser River	Little Weiser River to Galloway Dam	Cold Water Aquatic Life	Develop TMDL to Address: Sediment Add Temperature as a Pollutant of Concern Remove Bacteria as Pollutant of Concern. Develop Load Allocations for Total Phosphorus.
Upper Weiser River	West Fork Weiser River to Little Weiser River	No Impairment Found	Remove Segment from §303(d) list
Mann Creek	Mann Creek Reservoir to Weiser River	No Impairment Found	Remove Segment from §303(d) list
Cove Creek	Headwaters to Weiser River	No Impairment Found	Remove Segment from §303(d) list; Intermittent Water Body
Crane Creek	Crane Creek Reservoir to Weiser River	Cold Water Aquatic Life, Primary and Secondary Contact Recreation	Develop TMDLs to Address: Sediment and Bacteria. Develop Load Allocations for Total Phosphorus.
Little Weiser River	Indian Valley to Weiser River	Cold Water Aquatic Life, Primary Contact Recreation	Develop TMDLs to Address: Bacteria and Sediment. Add Bacteria as a Pollutant of Concern. Develop Load Allocations for Total Phosphorus.
Johnson Creek	Headwaters to Weiser River	No Impairment Found	Remove Segment from §303(d) list
West Fork Weiser River	Headwaters to Weiser River	No Impairment Found	Remove Segment from §303(d) list
North Crane Creek	Headwaters to Crane Creek Reservoir	No Impairment Found	Remove Segment from §303(d) list; Intermittent Water Body
South Crane Creek	Headwaters to Crane Creek Reservoir	No Impairment Found	Remove Segment from §303(d) list; Intermittent Water Body
Crane Creek Reservoir	Reservoir	Cold Water Aquatic Life (current standards)	Further study and assessment and appropriateness of designated uses

See the Addendum to the Weiser River Subbasin Assessment and TMDL for information about the Potential Natural Vegetation (PNV) temperature TMDLs.

The appropriate segments will require load allocations for total phosphorus, based on the need to address nutrient loading to the Lower Snake River. Total phosphorus allocations will be established to address the critical period of May through September, the critical time period as described in the *Snake River-Hells Canyon SBA-TMDL* (Idaho DEQ and Oregon DEQ 2004). This time period has been determined to be the most critical for controlling nuisance aquatic growth.

For the upper Weiser River upstream of the Little Weiser River, the data indicate that total phosphorus concentrations are well below the target set for the lower Weiser River segments. The upstream segment of the upper Weiser River and its tributaries should not receive allocations for total phosphorus.

Impairment of designated or existing uses was determined through assessment of biological indicators. For larger water bodies (greater than fourth order water bodies), the *Idaho River Ecological Assessment Framework: An Integrated Approach* (Grafe, C.S. (ed.) 2000) and the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002) were used to determine support status. The assessment is based on either impairment to biological indicators or comparison of water column measurements to WQS numeric criteria.

Numeric criteria were applied to segments where applicable data existed. Numeric criteria for dissolved oxygen, and bacteria were utilized. Data were collected or historic data were analyzed and compared to numeric criteria.

It is recommended that the following pollutants be removed from the §303(d) list:

- dissolved oxygen and nutrients on the lower Weiser River
- nutrients on Crane Creek
- nutrients and bacteria on the middle Weiser River.

It is also recommended that bacteria be added on the Little Weiser River.

A TMDL will be written for bacteria in the Little Weiser River.

In some instances, impairment was determined by the presence or absence of certain biological indicators, based on literature research of sensitivity to certain pollutants. For sediment, this was especially important. In the lower segments of the Weiser River, Little Weiser River, and Crane Creek, macroinvertebrate and periphyton analyses indicated that sediment is impairing cold water aquatic life. However, for Crane Creek, water column sediment data do not indicate sediment is at concentrations that would impair uses. For the Weiser River, macroinvertebrate community's structure and composition indicated substrate sediment deposition was the limiting factor. In this case, a percent fines substrate target was utilized.

2.7 Data Gaps

Most of the data gaps identified prior to developing the SBA were filled through monitoring conducted in the years 2000 through 2003 (Ingham 2000).

However, the data gaps that remain have hindered the ability to assess a water body and determine the support status of beneficial uses in the Little Weiser River. The lack of macroinvertebrate data from the monitoring season in the year 2000 has prevented the use of two metrics needed to assess the beneficial uses in accordance with the Idaho *Water Body Assessment Guidance* (Grafe et al. 2002). As the data become available, the SBA should be amended, and the TMDL should be modified if needed.

A sediment TMDL based on a substrate target was developed and will be presented in Section 5.0.

Another data gap is the comparison of TSS and suspended sediment concentration (SSC). It is recognized that the use of TSS may underestimate the true amount of sediment in the water column (Gray et al. 2000). In June, July, and August 2003, split samples were collected on the Weiser River at four sites on seven different dates. A regression analysis on the TSS and SSC data and the results are presented in Figure 62.

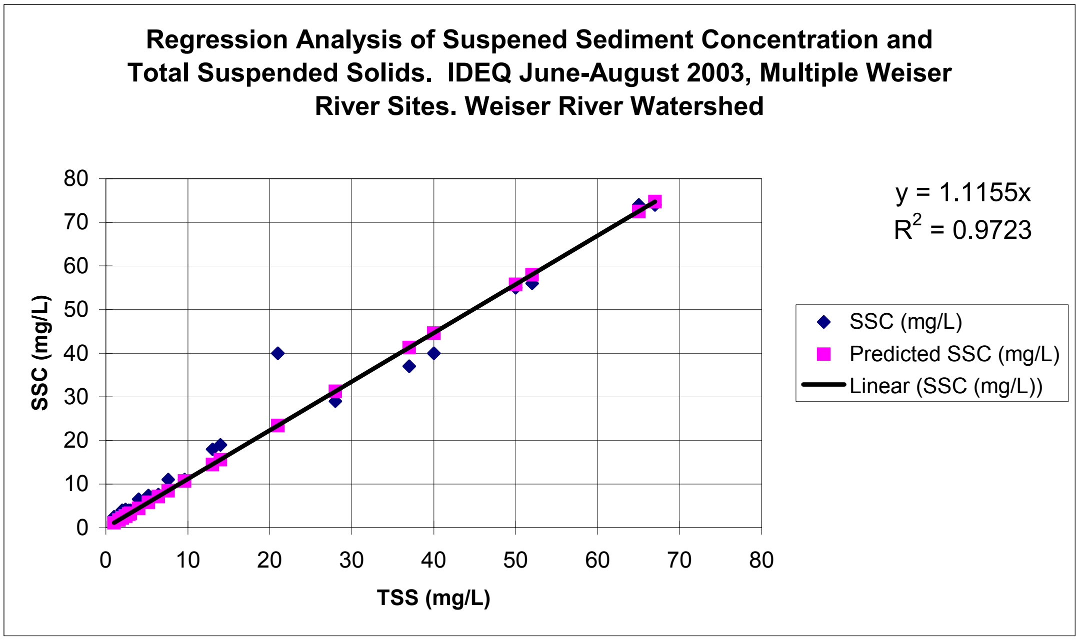


Figure 62. Regression Analysis of Suspended Sediment Concentration and Total Suspended Solids. Multiple Weiser River Sites. Weiser River Watershed.

As presented in Figure 62, there appears to be little difference in the SSC and TSS when all sites on the river are combined. As shown in Figure 63, this also appears to be true for the data collected at the lower Weiser River site located at the Highway 95 Bridge at Weiser, Idaho. The data show a strong correlation between the two parameters during the period samples were collected.

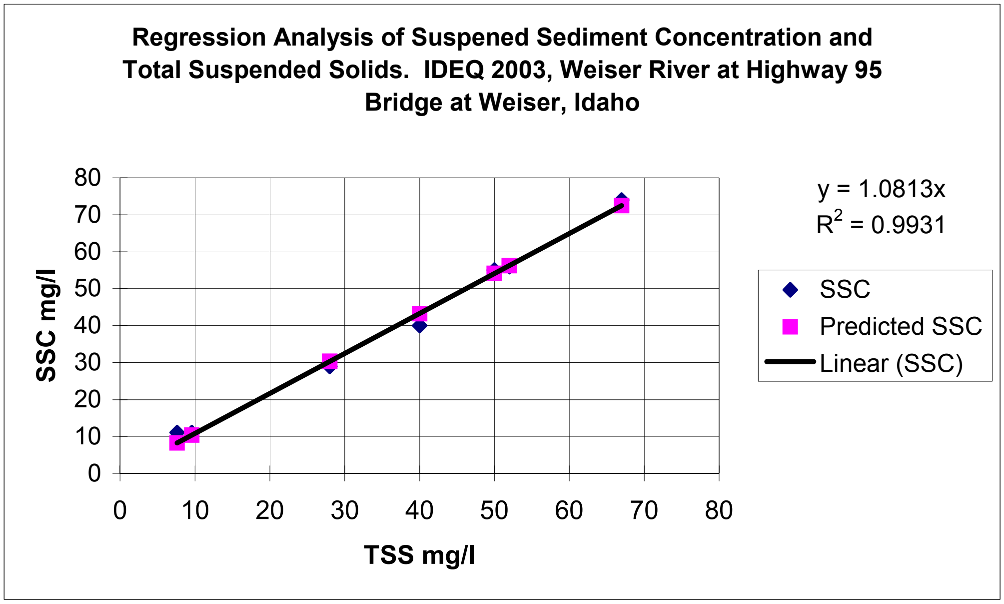


Figure 63. Regression Analysis of Suspended Sediment Concentration and Total Suspended Solids. Weiser River at Highway 95 Bridge at Weiser, Idaho. Weiser River Watershed.

However, none of the data presented in the regression analysis represent high discharge periods or periods when TSS reductions must be achieved. TSS data indicate that concentrations increase during high discharge periods. However, the relationship between TSS and SSC during this period is not understood. It is anticipated that SSC levels will increase due to the increased energy needed to transport and suspend larger particles.

Additional monitoring should be conducted with split samples at various sites on the Weiser River during high discharge periods. These data will enhance the ability to predict SSC during high discharge periods.

Bedload sediment is difficult to measure or quantify on large rivers like the Weiser River. Numerous models exist that could assist in determining the bedload movement in the Weiser River. However, bedload sediment data would be required to calibrate and verify a model. It is recommended that bedload sediment models be examined in the near future to determine appropriate data collection periods and procedures. Additionally, stream substrate should be evaluated in Crane Creek below the Crane Creek Reservoir dam.

More information is required to assess the status of beneficial uses in Crane Creek Reservoir. Pollutants in Crane Creek Reservoir are possibly caused by internal recycling, with minimal input from the tributaries.

High turbidity levels found in the reservoir during the year 2003 also appear to be caused by internal recycling and wave action. With little to no inflow during the period from July through August, the turbidity levels remained high.

A complete limnology study should be conducted on Crane Creek Reservoir. This study should accomplish two things:

1. Determine internal sources and causes of the high turbidity levels and concentrations of total phosphorus

2. Determine if the current designated use of cold water aquatic life is appropriate and attainable

There is no information on the pollutant or pollutants of concern upstream of the impaired segment of the Little Weiser River. Additional information on sediment and bacteria loads upstream of Indian Valley would assist in identifying sources and loads outside the impaired segment.

Analysis of Weiser River tributaries upstream from the Crane Creek confluence is needed to identify contributions from different land uses in that area. Water quality analysis is needed to determine the areas to target and the critical time period or periods for pollutant loading.